

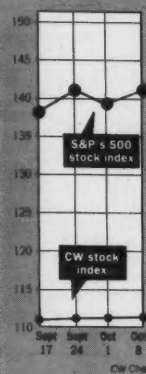
# COMPUTERWORLD

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OCTOBER 13, 1986

VOL. XX, NO. 41

## Stock update



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## CW's Annual Hardware Roundup: Small systems/51

## In Depth Prototyping: The first months, weeks, days and minutes in the life of a new system/93

# A hard day at the office for IBM

## Users confused over Minis aim at DEC, but delivery a year out mid-range strategy

By James Connolly  
and Stanley Gibson

Despite IBM's declaration that the company's mid-range direction is now clear, confusion swirled around the introduction of the IBM 9370 minicomputers last week.

Users were left wondering about price and performance figures even after IBM sales presentations. They also expressed confusion over the year-long delay in deliveries. Users pondered whether the 9370 and other IBM 370 architecture machines provide the top-to-bottom compatibility touted by firms like Digital Equipment Corp. and Wang Laboratories, Inc., which promise a common engine for all jobs.

Many users and analysts were unclear whether the new system is aimed at entry-level DP and departmental processing applications served by IBM's System/36 and System/38. IBM reacted by reaffirming that it will maintain separate mid-range architectures — the 370 line and the System/36 and 38 line.

Most users and analysts interviewed complained about a shortage of product details and inconsistencies in the information that they did receive.

"I'm excited from an architecture point of view," said John Wolfe, director of advanced systems research for Cigna Corp. in Hartford, Conn. But Wolfe noted that even after an hour-long presentation by

See **USERS** page 8

By Alan Alper

NEW YORK — IBM last week unveiled its response to Digital Equipment Corp.'s increasing mid-range strength with a family of minicomputers utilizing the 370 mainframe architecture.

But the announcements provoked further user confusion over IBM's efforts to integrate disparate processing systems. And an extended delivery schedule, not beginning until late 1987, provoked heated criticism (see related story at left).

Aimed at both commercial data processing and scientific/engineering applications, the 9370 series will run under IBM's VM and VSE operating systems.

With the announcement of the processors, IBM instituted a new "graduated" software pricing scheme — based on processor size and performance — for more than 90 mainframe architecture programs.

The company also unveiled new releases of its VM and VSE operating systems for the 9370, introduced yet another bridge between the 370 and System/36 and System/38 architectures and offered integrated software packages tailored for specific vertical markets (see related story page 6).

The processors in the 9370 Information System series will operate in office envi-

ronments as stand-alone units or can communicate between multiple locations or departments via leased lines and through Ethernet and Token-Ring local-area networks, respectively. A variety of devices can attach directly to the system, including 3270 and ASCII peripherals, as well as personal computers.

The 9370 family includes four models: Model 20, Model 40, Model 60 and Model

90, providing between 4M and 16M bytes of main memory and using proprietary processor technology. Prices for the family range from \$31,000 to \$210,000, according to IBM.

Volume shipments of Models 20 and 60 will begin in the third quarter of next year, whereas Models 40 and 90 will not be available in quantity until the fourth quarter, IBM said.

Frank A. Metz, senior vice-president and group executive of IBM's Information Systems and Products Group, said the 9370 was developed in response to customers who want to tie an organization together through the use of skills consistent with the 370 architecture.

"Unquestionably, our customers have been our partners in bringing out these systems," Metz said. "In fact, the 9370 is already part of the Travel Agent Manage-

See **MINIS** page 6

### HIGHLIGHTS

- Four 9370 models.
- Third-quarter 1987 delivery.
- Graduated software pricing and new VM. Page 6.
- Overseas sales stalling. Page 7.

## Computer crime bill passed with tough jail terms for offenders

### Reagan expected to approve law

By Mitch Betts

WASHINGTON, D.C. — Wrapping up a productive session of Congress on data security issues, the U.S. House of Representatives last week gave final approval to the Computer Fraud and Abuse Act of 1986, which expands federal jurisdiction to cover interstate computer crimes in the private sector.

Because the Senate approved it the previous week [CW, Oct. 6], the long-awaited computer crime legislation has been sent to the White House for President Reagan's signature. The U.S. Department of Justice has supported the bill, and Reagan is expected

to sign it.

Congressional approval of the computer fraud bill came shortly after enactment of the Electronic Communications Privacy Act, complementary legislation that outlaws the interception of data communications.

To avoid encroaching on states' rights, the Computer Fraud and Abuse Act applies only to interstate computer crimes and to computers used by the federal government and federally insured financial institutions.

The legislation makes it a federal misdemeanor to traffic in stolen passwords with intent to defraud or to intentionally trespass in a "federal-interest computer" to observe or obtain data.

The legislation makes it

a felony to access such a computer for a theft-by-computer scheme or to alter or destroy computer data — if the victim suffers a loss of at least \$1,000 or if the files are medical records — without authorization.

A felony conviction under the legislation could result in a federal jail term of up to five years for the first offense and 10 years for a second offense.

The interstate nature of the legislation is important because "people who have a compulsion to penetrate computer systems don't think about state borders," said John T. Vanadia, co-chairman of the government relations committee of the EDP Auditors Association. "This type of crime needs to be dealt with

See **CRIME** page 8

### TOP OF THE NEWS

Hitachi sources in Japan say the company will soon begin mainframe production in the U.S., planning direct U.S. sales. **Page 164.**

Baxter Travenol Laboratories, Inc. last week completed a five-year plan to switch from Burroughs to IBM. **Page 12.**

Lotus rolls out HAL add-on for 1-2-3. **Page 10.**

Mid-range 1100 processors complement Sperry's lineup. **Page 4.**

Sequoia Systems' fault-tolerant processor is ready for shipment after a two-year wait. **Page 19.**

The merged Burroughs-Sperry company plans to ax almost 10,000 jobs. **Page 166.**

A black market for stolen computer parts is thriving, computer crime experts say. **Page 141.**

Wang will release its long-awaited laptop computer next week, according to a source close to the company. The model price may have been reduced in

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NEWSPAPER



## NEWS

# Encryption-based security system designed for LANs

## Prevents access via network cable tapping

By Elisabeth Horvitz

MOUNTAIN VIEW, Calif. — A multilayered security system unveiled today by Sytek, Inc. is designed to prevent unauthorized users from accessing data during transmission over Sytek's System 2000 local-area network (LAN).

The company's Secure 2000 product uses the National Bureau of Standards' Data Encryption Standard (DES) algorithm. The Federal Bureau of Investigation is among the early users of the system, according to Sytek.

"Secure 2000 adds another level of security to our System 2000 interfaces, which already have password authorization," said Van Wilson, Sytek product line manager. "By encrypting data before it is transmitted, the Secure 2000 prevents unauthorized users from accessing the data by tapping into the network cable."

Secure 2000 consists of two types of network interface: the 2503 Secure Packet Communication Unit (PCU), a two-port device that performs data encryption for terminals and microcomputers; and the 2533 Secure Modular PCU, an eight- to 32-port device that performs encryptions for the host.

A user wishing to transmit to a host gains access to a Secure PCU by entering the correct password. If the user requests access to a secured host, the user's and host's Secure PCUs send their encryption keys to the 5130 Key Distribution Center,

which determines whether the user is authorized to access that particular host.

If access is allowed, the center creates a new encryption key and downloads it to the PCUs, which use it to encrypt and decrypt transmissions during the session.

The center keeps a log and audit trail of authorized host access requests and unauthorized attempts at access.

"Secure 2000 enables companies to divide their users up into sub-networks, which have access only to certain hosts," Wilson said.

"The big bugaboo of broadband and baseband networks has been the availability of information for all to see," said Joseph Healy, a group manager at Fairfax, Va., consulting firm Network Strategies, Inc.

"While the National Security Agency will never certify DES to protect government classified information, implementing the algorithm should give Sytek a big leg up with security-minded network customers," Healy added.

The Key Distribution Center requires a dedicated IBM Personal Computer AT or compatible running IBM's PC-DOS Version 3.1 with a 20M-byte hard disk and 512K bytes of main memory.

It is priced at \$4,995, PC not included.

The 2503 PCU is priced at \$1,495, or \$300 more than a standard PCU. An eight-port 2533 Secure Modular PCU is priced at \$5,395, or \$995 more than the standard Modular PCU. Each additional interface card, which adds two more ports to the 2533, is priced at \$895.

Secure 2000 is available now.

## Laberis named CW editor

Bill Laberis has been named editor in chief of *Computerworld* newspaper, effective immediately.

Laberis, 36, succeeds Terry Catchpole, who will develop new publishing opportunities for CW Communications, Inc. (CWCI), the parent organization of *Computerworld*.

Laberis comes to *Computerworld* from *Micro MarketWorld*, a CWCI publication for computer dealers and value-added resellers. As editor of *Micro MarketWorld* since July 1985, Laberis oversaw the transformation of that publication from a biweekly to a weekly frequency beginning this past September.

Regarding his appointment to the new post, Laberis said, "The opportunity to serve as editor of the No. 1 trade publication in the country is a great honor and a tremendous responsibility."

"The computing professional's environment is changing as fast as the technology that shapes it. If we at *Computerworld* are to be true to our mission, we must reflect this change

accurately in our presentation. This means looking at *Computerworld* as critically as we do the issues of the day."



Bill Laberis

Laberis started in computer journalism nearly six years ago when he joined *Computerworld* as a staff writer. He was promoted to senior writer and then to senior editor of the Computer Industry section.

In January 1984, Laberis was named managing editor, a post in which he managed the week-to-week news operation.

Prior to his *Computerworld* experience, Laberis was a general-press reporter for various Boston-area daily newspapers.

He graduated from Columbia University with a degree in economics and did graduate studies at the University of Rhode Island.

Laberis is a member of several computer industry groups, including the Comdex Advisory Board, PC Expo Advisory Board, Microcomputer Graphics Advisory Board, Boston Computer Society and the American Business Press Association.

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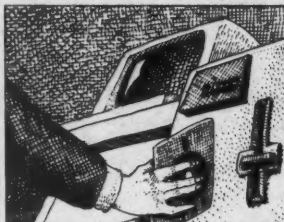
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### HARDWARE ROUNDUP

The U.S. will ship roughly 232,000 small machines in 1986, bringing the domestic tally of systems in use to 1.6 million, according to International Data Corp. figures. These numbers show domestic shipments in 1990 topping 387,000 or 2.9 million small systems in use. This week's Hardware Roundup examines this highly competitive market. By Donna Raimondi/ 51

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## NEWS

# Sperry mid-range line fills compatibility gap

## Will also tie Unix line to IBM world via SNA

By Donna Raimondi

BLUE BELL, Pa. — Filling a gap between its mainframe and departmental systems, Sperry Corp. last week announced a line of mid-range processors designed to be compatible with its 1100 series mainframes.

Additionally, the company bolstered its small computer system and Unix-based product lines and said it intends to connect its Unix lines to the IBM environment through IBM's Systems Network Architecture (SNA) communications protocol.

The 2200/200 mid-range series, under development since 1983, and some of the other products were released early in part to assure Sperry customers that they will not be abandoned because of the Sperry-Burroughs Corp. merger, a spokesman said.

### Micro-mainframe integration

The announcement represents Sperry's strategy to tie all its systems together, allowing micro-to-mainframe product integration within its own product lines, said Jan Lindelow, deputy to the vice-chairman of Sperry.

Among the new products were the following:

- The general-purpose 2200/200, which fits into Sperry's product line between the departmental System 11 and the 1100/70 mainframe. It will include one- to four-processor models with 1.5 million instructions per second per processor running under Sperry's OS 1100 operating system.

The systems' sizes fall between traditional mainframe and existing supermini-computer machines from IBM and Digital Equipment Corp. The 2200/200 systems do not require computer-room environmental conditions. Prices start at \$200,000 for a basic one-processor model, according to Sperry.

- DSS Phase 1, six software products that allow exchange of information between Sperry's mainframes, departmental and personal computers. DSS is the first phase in a series of products designed to allow compatible information exchange between Sperry systems and IBM Dis-

tributed Office Support Systems. It costs from \$850 for micros to \$42,750 for Series 1100 systems.

- Two high-end models of Sperry's System 80 small-scale systems, the Model 10, with a \$132,394 price tag, and Model 20, which sells for \$217,314. These models run under Sperry's OS/3 operating system.

- Mapper C, a C language version of Sperry's Mapper fourth-generation language that previously ran only under Sperry's proprietary operating systems and will now run under Unix. License costs range from \$7,900 to \$42,000, depending on processor size.

- Two entry-level 32-bit Unix systems, the Series 5000 Model 30, which costs from \$14,900 to \$18,310, and the Series 7000 Model 30, which costs from \$136,000.

- The Distributed Communications Processor (DCP)/15, the smallest member of Sperry's family of front-end networking processors, costs from \$17,000 to \$50,000 for effective support of six to 52 lines.

### 'Sperry keeping identity'

"Most people in the Sperry community wondered if they would have the same lines now that Burroughs took them over. Sperry kept telling us they would keep their identification, and this makes me feel better that that will happen," said Bob Hearon, director of data processing at Hayes International Corp., a Birmingham, Ala., firm that modifies government aircraft.

Hearon, who has a Series 1100 Model 70 and Mapper II development system, also praised Sperry's Mapper C concept. He said it could enable companies like his to cut the costs of software development by developing on smaller machines.

Sperry officials said that by the first quarter of 1987, the firm would announce the ability of its Unix families to connect, via IBM's SNA, into the IBM environment. While this time frame certainly does not put Sperry on the leading edge of multivendor connectivity, it is a pragmatic approach that may not be seriously late in respect to Sperry's own client base, International Data Corp. analyst Richard Mikita said.

The vendor also said that two groups of applications software for the 2200/200 machines, geared to

manufacturing, public sector and communications use, will debut in November 1986 and March 1987.

While the announcements appear to be aimed partly at invading the IBM and DEC mid-range systems markets, the primary focus is Sperry's own customer base, Mikita said. "The 2200/200 system is unlikely to make headway in either DEC or IBM's territory. On the other hand, the Unix machines are more of an attempt to get new accounts."

### Proprietary chips

Both the 2200/200 systems and the DCP/15 front-end processor are based on proprietary CMOS chips manufactured by Sperry. The first model released, the 2200/201, provides up to 24M bytes of main memory and will hold up to eight integrated 140M-byte disk drives in a 10½-sq-ft space. The basic cabinet contains slots for upgrading to the dual-processor 2200/202. The unit will be beta tested in November and should ship in February 1987, the vendor said.

The Series 5000 Model 30 will be shipped in November 1986; the Series 7000 Model 30 is available now. Mapper C, available on the older Series 5000 models now, will be available for the Models 50 and 90 in November. For the Series 7000 systems, it will be ready early in 1987, a spokesman said.

DSS is available now; DCP/15 will be available in March 1987.

## TOP OF THE NEWS

### NEWS from page 1

the last few months, as customers who did not show a great deal of enthusiasm for the almost \$4,000 price tag talked about in summer prerelease demonstrations, the source said. The laptop is said to include a 10M-byte Winchester disk drive and a built-in printer.

Microsoft chairman Bill Gates recently told a gathering of OEMs in Munich, West Germany, that an MS-DOS operating system that exploits the full capabilities of the Intel 80386 microprocessor will not be available until the end of 1987.

In other news, Microsoft put an end to copy protection with the announcement of a nonprotected version of Excel, its integrated package for Apple Computer's Macintosh, as well as the removal of protection on all its Macintosh applications.

SPSS, Inc. has made two of its mainframe statistical analysis packages available to run under AT&T Unix System V, including the AT&T 3B line of minicomputers, the Sperry 5000 line and the IBM RT Personal Computer. Known as SPSS-X and SPSS-X Tables, the packages retail for \$2,000 to \$10,000, SPSS officials said.

Apple Computer's legendary TV advertising will return during next Saturday's World Series broadcast with the first of an 11-spot ad campaign. Four of the spots are aimed at the business market.

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## NEWS

# IBM offers graduated price structure, enhances 370 software

## Lays foundation for integrated architecture

By Rosemary Hamilton

NEW YORK — Completing its mid-range system announcement last week, IBM radically altered its 370 software pricing structure to provide lower prices for smaller processors running under VM and VSE.

Additionally, IBM announced a number of enhancements to those operating systems, including an entry-level package that consists of VM and applications packages and is targeted primarily at the the 9370 processors.

"They have laid the framework for an integrated software architecture that will be upwardly and downwardly mobile," said Clare Fleig, director of systems research at the International Technology Group in Palo Alto, Calif.

### Graduated pricing structure

The graduated pricing structure applies to processors based on the 370 architecture. These processors have been divided into four groups based on processing power. As the processing size grows, so does the one-time charge applied to the group.

This structure replaces a one-time charge method that applied to all processors under the 370 umbrella.

"If you're considering a

9370, now you have a lot more incentive," Fleig said. "This pricing encourages users who might be wavering toward a Digital Equipment Corp. VAX to go with IBM."

Coming under the graduated pricing structure are a number of VM- and VSE-related software products announced last week; most will be available in mid-1987. Both the new release of VM/SP and a version of VM/SP, called VM/Integrated System (IS) — the entry-level operating environment — can run on the 9370s.

### IX/370 as VM guest

Two other operating systems, VSE and MVS, can run on these systems as VM guests. IBM plans to offer its Unix operating system, IX/370, as a VM guest for the 9370s in late 1987.

According to Randall Porter, supervisor of VM technical support at American Can Co., the new release of VM will "help us address many of our needs. Our VM system has been fighting a battle with the PC community here," Porter said. "So anything that makes VM more user friendly is good for us. I wish they did those new features for VM/SP 4," he said of the current VM release, which he runs on an IBM 3033.

IBM also spruced up its VSE system. "VSE is older, and IBM wishes that it would just go away," Fleig declared. "What they did was offer basic enhancements, not real significant features

like those added to VM."

Effective immediately, the graduated pricing structure involves more than 90 software programs that run under VM or VSE and cross-system licensed programs, which run under both VM and MVS. Included in this structure are the VM and VSE releases announced last week, such as the Professional Office Systems (Profs) Version 2 and a number of programming languages and compilers.

For example, Profs Version 2 had a one-time charge of \$32,000 prior to the announcement. With graduated pricing, it will cost \$12,800 as a first-category processor in Group 10. This group includes the two low-end models of the 9370 line, the Models 20 and 40, as well as the 4361 Model 3 and the 4341 Model 9. The software carries a one-time charge of \$22,400 for processors in Group 20, which includes the remaining models of the 9370 line, as well as the 4381 Models 1 and 11, the 4361 Models 4 and 5 and the 4341 Models 1, 2, 10, 11 and 12.

For processors in Group 30 and Group 40, the one-time charge is unchanged at \$32,000. Group 30 includes all models of the 3083 line and Models 2, 3, 12, 13, and 14 in the 4381 line. In addition to the 3090 line, Group 40 includes all models in the 3084 and 3081 lines.

The VM releases are targeted at both the full line of 370 processors and the hardware announced last week.

In general, VM users reacted positively to the offerings.

"The idea that VM is getting down to lower and lower systems is very important to us," said Ralf Kuehn of the technical support staff at Mitre Corp. in McLean, Va. Kuehn, who currently runs VM/SP Release 3 said he is eager to upgrade to VM/SP Release 5 because "there are so many good features it's mind-boggling."

However, one user said that, as a large-system operator, he found the announcement disappointing.

"Release 5 doesn't have a high-performance option like Release 4, and the 3081 that we have without the high-performance option doesn't do us a lot of good," claimed Gary MacAdams, manager of IBM technical support at Northern Telecom, Inc.

VM/SP Release 5 will provide VM-program-to-VM-program communications between separate VM operating environments. It also offers the Transparent Services Access Facility, which provides transparent access to server resources and supports the 9370 Token-Ring Adapter and the 9370 IEEE 802.3 Adapter for Ethernet-based local-area networks.

With graduated pricing, VM/SP Release 5 will have a one-time charge ranging from \$7,740 to \$30,950.

### Entry-level environment

A second VM announcement is aimed at the 9370s, although it can be used on selected 4300 models. As the

entry-level operating environment, VM/IS Release 4 "reduces the skill level and effort required to install and use the system," the vendor said.

VM/IS has two main components. The actual operating system portion, VM/IS Base, incorporates the functions of VM/SP Release 4, a prior release. There are eight optional application packages that, together with VM/IS Base, create what amounts to a prepackaged data center. VM/IS Base has a starting price of \$26,840 for Group 10 processors. A one-time charge for high-end systems is \$100,520.

With the introduction of VM/IS Base, the vendor has removed the operating restrictions — such as no guest support — that existed with VM/SP Release 4.

VM/IS and VM/IS Base effectively replace the VM/SP End-User Software Support System and the VM/SP-Entry offerings. They additionally incorporate the features of VM/SP-System Base, which has been discontinued.

Along with VM/IS, IBM will offer a service program, VM/Remote System Programming, which has a starting price of \$625 per month.

The new VSE products include the VSE/SP Version 3 Release 1, which starts at \$29,315 for a Group 10 one-time charge; VSE/SP Version 2 Release 1.6, which starts at \$23,110; and the Decision and Information Productivity Facility/VSE, which starts at \$2,640.

## Minis take aim at DEC machines

From page 1

ment System we're developing with United Airlines."

The debut of the 9370, while providing a unified architecture for mid-range to mainframe processing, does prompt some intriguing options. The high-end 9370 overlaps the 4381 Model 11 intermediate processor by providing 10% to 15% more performance, noted Dick Odell, a senior product planner, while the entry-level 9370 offers slightly better performance than the System/36 and System/38.

The choice between installation of a 370 or System/36/38 architecture depends on the specific application, Odell said.

"Clearly, the 36/38 is not as smart with math, while the 9370 is," he said, adding that first-time mid-range customers would be more apt to go with the System/36/38 architecture because of its lower price.

IBM cautioned, however, not to expect any members of the 4300 family or System/36/38 line of being withdrawn from the market.

Both the System/36/38 and 370

| IBM 9370s                                  |                        |                        |                        |                        |                         |
|--|------------------------|------------------------|------------------------|------------------------|-------------------------|
| Four models stacked against DEC            |                        |                        |                        |                        |                         |
|  | IBM 9373<br>Model 20   | IBM 9375<br>Model 40   | DEC<br>VAX 5200        | IBM 9375<br>Model 60   | IBM 9377<br>Model 90    |
| Million Instructions<br>per Second (MIPS)* | .5                     | .5                     | 1                      | 1.3                    | 2.6                     |
| Memory Range                               | 4M-16M                 | 8M-16M                 | 4M-24M                 | 8M-16M                 | 8M-16M                  |
| Base Price                                 | \$31,000<br>(4M bytes) | \$65,000<br>(8M bytes) | \$79,000<br>(4M bytes) | \$93,000<br>(8M bytes) | \$190,000<br>(8M bytes) |
| Price per MIPS<br>for Typical System*      | \$77,500               | \$160,000              | \$71,000               | \$104,500              | \$84,800                |

\* Estimated by International Data Corp.

architectures will continue to coexist in the middle range, noted Robert E. Dies, president of IBM's South West Marketing Division. "The two general-purpose mid-range solutions, the 370 and the System/36/38 family, provide system alternatives between the workstation and the high end," he said.

### Hot-key method

In a related announcement regarding System/36/38 enhancements, IBM also unveiled a hot-key method for users to switch between concurrent sessions running on 370 and System/36/38 systems. The 5209 Model 1 3270-5259 link protocol converter enables up to seven IBM 3270 devices

to have concurrent access to System/36/38 and 370 host applications. Available in the second quarter of next year, the unit lists for \$5,595.

With the introduction of the 9370 line, the IBM 370 architecture spans a performance range from 0.5 million instructions per second (MIPS) with the smallest 9370, the Model 20, to about 50 MIPS with the high-end 3090 series. There is a fivefold performance increase through the 9370 family, meaning a Model 20 running VSE and CICS can process 5,000 transactions an hour, compared with 25,000 per hour on the Model 90, an IBM spokesman said.

In a typical configuration, the 9370 Model 60 offers up to four times

the performance and twice the internal memory of the current entry-level 370 at about the same price. The Model 20 offers better performance than the current entry-level 370 at half the price, IBM said.

### Common power source provided

The 9370 uses rack-mounted packaging, providing for a common power source for the processor, I/O controller and storage components. Its modular design facilitates the attachment of storage devices, 3270 workstations, local-area networks and other 370 devices through integrated I/O subsystems.

IBM's 9332 and 9335 direct-access storage devices, unveiled last June for use with the System/36/38, are the mass storage devices offered with the 9370 family. The rack-mounted 9332 and 9335 provide 400M and 800M bytes of mass storage, respectively. Up to 48 storage devices are supported on the 9370, depending on the model, IBM said.

IBM unveiled a new 1/4-in. tape drive for use with the 9370 family. The 9347 tape drive, with a density of 1,600 bit/in., operates at either 25 in./sec. or 100 in./sec. It lists for \$7,900.

Each controller within the workstation subsystem of the 9370 can at-

See MINIS page 7



## NEWS

# Overseas sales forecast yanks down profit outlook for IBM

## Stock dives; merger of business staffs looms

By Clinton Wilder

ARMONK, N.Y. — In an announcement that clouded its heralded product introductions and bodes ill for its quarterly earnings to be announced this week, IBM last week said that the growth rate of its non-U.S. business slowed in the third quarter.

Although the company provided only sketchy details, the news was significant enough to cause Wall Street analysts to reduce their Big Blue earnings forecasts, and it drove IBM's stock down more than five

points last Tuesday. With its domestic growth slowed badly since mid-1985 and no meaningful comeback in sight, foreign markets had provided a much-needed component of IBM's earnings.

E. F. Hutton & Co. analyst Michael Geran said he reduced his 1986 revenue estimate for IBM by \$1 billion to \$52 billion and his per-share profit estimate from \$9.80 to \$9.40. IBM earned \$10.67 per share in 1985 and is almost certain to post a second straight year-to-year drop in operating profits for the first time since the 1930s.

An IBM spokeswoman said the company's U.S. business "is in the same situation that it has been. It is

stable, but we have not seen a turn-around yet."

"The days of wine and roses are over," Geran said. "The price elasticity of demand is so weak, now overseas as well as in the U.S., that IBM's strength in the Sierra line is not enough."

Industry analyst Bob Djurdjevic of Annex Research, Inc. in Phoenix, speculated that the order cycle of the 3090 abroad is following the same pattern it did in the U.S., where IBM accelerated early shipments of the computer in late 1985 to boost the year's sales.

"That cycle is slowing overseas now," he said. "In both marketplaces, the Fortune 500-type compa-

nies have already placed their orders, and IBM has to go after the second-tier companies."

In a separate announcement relating to its financial situation, IBM said it will consolidate the headquarters of four major business units at a new Somers, N.Y., facility in 1988. The move will allow IBM to reduce its administrative staffs by several hundred people, who will be offered positions in other IBM units.

The consolidation will include the headquarters of eight different divisions: communication products, entry systems, information products, system products, data systems, general products, general technology and systems technology.

## Minis take aim at DEC machines

From page 6

tach up to 32 IBM devices, including Personal Computers, 3270 workstations and printers as well as non-IBM devices through a serial OEM's interface. A maximum of 12 controllers can be used with the high-end 9370 to support local attachment of up to 384 workstations, IBM said.

### Variety of protocols supported

The communications subsystem provides support for a variety of communications protocols, including ASCII devices, the IBM Token-Ring and Ethernet local-area networks. IBM is offering an adapter to connect the 9370 to local-area networks conforming to IEEE 802.5. From two to 12 communications controllers can be integrated in the 9370, depending on the model.

An optional 370 block multiplexer channel is being offered to attach certain devices that run on other IBM 370 computers. It attaches between one and eight controllers and is available on all 9370 models with up to 12 channels on the largest of the processors.

The Model 20 provides an estimated aggregate I/O capacity of up to 5.5M byte/sec. I/O slots for attaching up to seven cards are provided inside the processor unit. Models 40 and 60 each provide an estimated aggregate I/O capacity of up to 22M byte/sec. Up to 17 cards can fit inside the processor unit of both.

### Rack-mountable unit

The Model 90 offers an estimated aggregate I/O capacity of up to 39M byte/sec. It features a separate rack-mountable unit that has between 10 and 54 I/O card slots, depending on the configuration chosen.

The new processors use IBM's 1M-bit memory chips and a new generation of high-speed bipolar logic, which condenses more than 4,000 circuits into a single chip and more than 40,000 circuits into a logic card.

The Model 90 is the first IBM processor to use the air-cooled Thermal Conduction Module, which houses the processor logic, cache memory and control storage. The 3090 was the first processor from IBM to use a water-cooled Thermal Conduction Module.

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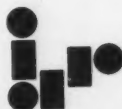
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## NEWS

# IBM's candor around the office leaves much to be desired

## Outfoxing DEC minis hazardous to S/36, 38

By James Connolly

If IBM's introduction of the 9370 minicomputer last week was a counterattack against Digital Equipment Corp.'s advances in the mid-range market, it was a poorly timed defensive maneuver. It might even be classified as a desperate move.

The announcement of the 9370 and a tiered pricing structure designed to make selected software products attractive to mid-range systems buyers came in the wake of an eight-month-long string of DEC VAX 8000 introductions. IBM wanted to slow advances by DEC and other minicomputer vendors that have

chipped away at IBM's mid-range market share. Those advances have made DEC this year's computer industry success story.

It may be that the 9370 will prove to be a powerful, versatile, office-environment machine that can support departmental computing, engineers and businesses that want

to move up through the IBM mainframe line. But IBM stirred up confusion by leaving to speculation — on the part of users and analysts — where the 9370 is targeted.

Normally, mid-range systems are announced a few months before they are ready. The 9370 will not be ready even for beta test until February.

The risk IBM runs is that the 9370 may kill sales of other IBM mid-range

systems, such as the 4361 and the System/36, 38 and 88, during the year-long wait until the 9370 is available.

Driving the speculation was confusion about whether the 9370 is intended to replace the System/38 and System/36 as small business DP machines or office automation systems.

The most common view of the 9370's positioning is that it will support software development and testing before a program is uploaded to a larger host, support technical computing and allow mainframe applications to be run at the departmental level or in remote locations. But IBM would not even comment on whether the system is a replacement for the

4361 as an engineering system, to which most signs point.

Overall, users and analysts expressed displeasure with the way the introduction was handled. Announcement letters were withheld from analysts for a full day. IBM, for one of the few times in its history, made price/performance comparisons with VAXs and other systems but withheld performance numbers.

For some observers, the 9370 debut brought back memories of the PCjr announcement in 1983, when IBM played Scrooge by introducing the system just as other home computer vendors were praying for a Christmas rush but then not delivering the product until after the holidays. Like its competition in the home market, the PCjr died a quick and painful death.

## Users unsure about strategy

From page 1

IBM officials, he was unsure how much technical support the 9370 requires and how the performance compares with the earlier low-end 370 machine, the 4361.

As an example of the inconsistencies, International Data Corp. (IDC) analyst Richard Mikita noted that IBM product literature claimed the high-end 9377 Model 90 supports 384 concurrent users, while IBM officials told analysts that it supports 150 users.

When asked about the difference, an IBM spokesman said the system supports up to 384 physical connections but that customers are more

likely to connect 100 users in a highly interactive environment or 200 less demanding users.

A clear-cut conclusion seemed to be developing that after two decades of creating reaction among competitors, IBM is now reacting to the drive into the IBM mid-range market by companies such as DEC, Wang and Hewlett-Packard Co.

The 9370 apparently will be offered for 370-environment DP applications, while the System/36/38 will be aimed more at office automation or smaller DP shops.

"They positioned it as a straight DP machine for people running VM or MVS SP or even Unix," Wolfe said. "We have really agonized over whether to train our staffs on the System/36 or Series/1 or whatever. The benefit I see is that we don't have to

retrain those people who have been working with the mainframes."

An analyst who was looking for greater office automation capabilities out of the system that had been billed as the Micro370, John McCarthy of Forrester Research, Inc. noted that personal computer support seemed limited and that the late 1987 general availability date was too far off.

"With a year's lead time, they aren't pulling the wool over anybody's eyes. The question is whether the users are going to wait," McCarthy said.

But amid complaints about the delivery date for the four models of the 9370 line, users lauded IBM's announcement that more than 90 software products will be offered with graduated prices, based on the size of the processor.

"I'm surprised they would do that. I thought they were putting more emphasis on software pricing to provide an underpinning for their revenue base," noted Ted Merkel, vice-president of information systems development at Certainteed Corp. of Blue Bell, Pa.

"One thing that is good is to relate the software cost to the real value you receive," said Robert J. Boehm, data

center director at Alverno Administrative Services in Beech Grove, Ind. "Hopefully, that will go on throughout the industry."

Former IBM executive George McQuilken, who as chief executive officer of Spartacus Computers, Inc. introduced a system similar to the 9370, said, "everyone has to benefit" from the tiered pricing approach.

McQuilken, who is now president of Software Productivity Research, Inc., said he is curious how independent software vendors like Cullinet Software, Inc. and Management Science America, Inc. will react.

"Most of them have been pretty consistent in their prices for mainframe software. With one swoop IBM probably changed the software industry, at least as it applies to IBM mainframe software, which is 90% of the mainframe software industry," McQuilken said.

But one manager, Henry S. Roberts, senior vice-president of American National Bank and Trust Co. of Chicago, was cynical: "The strategy is to increase the amount the customer spends on software. Even though the price may decrease on some packages, a user may have to buy other facilities, bundled

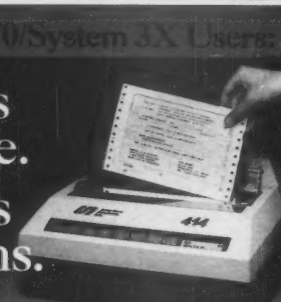
equipment, etc., that, in the end, results in a higher price."

IDC's Mikita speculated that the 9370 announcement will impact Wang more than DEC. He said that, contrary to some preannouncement industry speculation, the 9370 is not meant to compete with the DEC Microvax II. In comparing DEC and IBM performance ratings, he positioned the 9370 against the VAX 8200 at the low end up to the VAX 8550.

"It will be used either by people who have large commitments to mainframe machines and want to do their development on these machines or want to spin off a specific application at the departmental level," Mikita said.

"The way Wang has been selling its VS has been to emphasize that you can write in Cobol on the VS and move it over to an IBM mainframe," he added.

Meanwhile Carol Highfill, director of planning and office automation at American Cyanamid Co. in Clifton, N.J., said the announcement will not cause her company to place acquisition plans on hold but commented, "We certainly have to stop and re-evaluate. It is going to cause us to think."



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## Crime bill passes House

From page 1

by the Federal Bureau of Investigation," he added.

### Encourage prosecution

Vanadia expressed hope that the new federal laws will encourage corporations to prosecute computer crimes more often, rather than keep them quiet.

"It's a positive step, but it will take about three to five

years before law-enforcement authorities catch up with the legislation and really start using it," commented August Bequal, a Washington, D.C.-based attorney specializing in white-collar crime.

Congress studied computer crime legislation for several years — the first bill was introduced in 1977 — and in 1984 passed a limited statute covering only U.S. government computers.

### Negotiation

Passage of a bill covering the private sector was as-

sured this year after six months of negotiating between the House, Senate and U.S. Justice Department produced a compromise on the proper federal role in computer crime [CW, April 28].

The Electronic Communications Privacy Act legally prohibits private citizens from intercepting data communications, such as electronic mail and electronic funds transfers, without authorization.

The Act also requires government agents to get court orders to obtain access to electronic communications.



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| PDSFAST   | 3 min. 23 sec.  | 8 sec.          | 712     | \$4.22   |
| 12 cyl. PDS Copy                                |                 |                 |         |          |
| lebcopy   | 9 min. 14 sec.  | 1 min. 20 sec.  | 10,792  | \$18.47  |
| PDSFAST   | 48 sec.         | .7 sec.         | 122     | \$1.75   |
| 47 cyl. PDS Unload to Tape                      |                 |                 |         |          |
| lebcopy   | 58 min.         | 14 min. 52 sec. | 97,253  | \$92.05  |
| PDSFAST   | 4 min. 3 sec.   | 37 sec.         | 911     | \$5.74   |
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## NEWS

# Lotus aims to bolster 1-2-3 base with language interface

## HAL averts risky rewrite of code

By Douglas Barney

NEW YORK — Moving to extend the life span of the dominant microcomputer spreadsheet product, Lotus Development Corp. last week announced HAL, a natural language interface for 1-2-3 acquired from GNP Development Corp. in January.

"It is strategic in that it is a way for Lotus to bring the function of 1-2-3 up a little

without having to rewrite code. It is nurturing its 1-2-3 base," said Mike Milliken, associate editor of Patricia Seybold's Office Computing Group.

One user agreed. "We have seen some of our peers jumping to the other packages. The industry is too volatile for anyone to rest on their laurels," said Fred M. Zickert, manager of personal computers for Eaton Corp. of Cleveland.

According to Milliken, Lotus's option of rewriting 1-2-3 to boost functionality could

have produced a user backlash due to problems in upgrading and potential product incompatibilities.

The \$150 random-access memory (RAM)-resident product, which debuted at the Info '86 show held in New York, allows users to create and manipulate work sheets through English-language phrases.

With HAL, users can undo the last command executed to correct errors or compare two different "what-if" scenarios. The product can help create macros by recording

all 1-2-3 commands and HAL requests used during a session.

Since its acquisition from GNP, HAL has undergone a radical transformation, according to Alexis Driscoll, HAL product manager.

"It is half the size that it was and five times as fast," she said.

One drawback of HAL, however, is that it takes up RAM and therefore decreases the maximum size of spreadsheets.

"To load HAL is 108K bytes, and Undo reserves

half of your RAM to back up your work sheet. If your work sheet is that huge you can turn Undo off," Driscoll noted.

Driscoll downplayed the decrease in work sheet size. "Our informal research indicates that most users have relatively small work sheets, so small that it will never be a concern," she said.

HAL runs on IBM Personal Computers and compatibles with at least 512K bytes of RAM. It requires 1-2-3 Release 1A, Release 2 or Release 2.01.

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## Stratus to unveil mid-range systems

By Donna Raimondi

MARLBORO, Mass. — Stratus Computer, Inc. is scheduled this week to release entry-level and mid-range models in its line of 32-bit Continuous Processing System computers and a high-speed disk drive subsystem with removable drives.

The products are competitive with Tandem Computer, Inc.'s EXT processors and V8 disk subsystems, said Omri Serlin, an analyst at Itom International Co.

The \$95,000 entry-level

FT250 Continuous Processing System is said to perform five transactions per second based on the ET-1 benchmark. ET-1 measures teller transactions. The FT250 will replace the earlier version of the model with the same name that featured the same ET-1 rate. It frees up two module slots for additional I/O devices.

Stratus also announced the mid-range XA420, said to perform 10 transactions per second based on ET-1 benchmarks. It has an 8M-byte main memory and costs

\$211,000.

The Model D201 portable disk drive is the company's first user-serviceable and removable disk drive. The D201 has an 8-in. 151M-byte Winchester drive encased in a portable metal carrier. Up to eight carriers can be housed in a 54-in. expansion cabinet.

The \$101,200 Model D218 eight-drive system has 1.2G bytes of storage capacity. The four-drive subsystem, Model D214, has 0.6G bytes of capacity and costs \$61,200.

## Relational processor link for Focus users

By Charles Babcock

NEW YORK — Information Builders, Inc. last week announced an interface that will allow a Focus user to pass a request for data through an IBM mainframe to a Teradata Corp. relational data base machine, speeding ad hoc queries against large Focus data bases.

Information Builders President Gerry Cohen said his firm was receiving requests from users of Focus, a fourth-generation language and relational data base management system, to load large data bases onto fast-processing relational hardware.

The interface will work with Focus running under both MVS/TSO and VM/CMS and execute the standard Focus reporting and data analysis functions.

The interface will employ IBM's SQL to communicate with the Teradata DBC/1012 data base machine. Data bases on the DBC/1012 can be tapped by Focus's relational JOIN operation and permits up to 16 different tables to be linked.

Some of the data bases that can be accessed on the mainframe include IBM's DB2, SQL/DS, DL/1 and IMS; ISAM, VSAM and QSAM; Cul-

inet Software, Inc.'s IDMS; Applied Data Research, Inc.'s Datacom/DB; Software AG of North America, Inc.'s Adabas

and Focus files.

The interface will be available Nov. 1 for \$8,500, or \$240/month rental.

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### □ REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA.

Relational DBMSs have always dealt with logical sets of data. But they manipulated only one physical record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands, of records at a time.

### □ REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER RESOURCE USAGE.

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### □ REASON #4: MULTI-TABLE CLUSTERING OPTIMIZES JOINS.

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

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| MO Mobile . . . . . Sep 10                                     | Tampa . . . . . Aug 6   | Nov 4, Dec 18  | Aug 12, Sep 24, Oct 29, Nov 12                         | Lubbock . . . . . Oct 2                              |
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## NEWS

# Hospital supplier swaps Burroughs for IBM

**Five-year conversion costs \$14 million, ups system capacity**

By Jean Bozman

CHICAGO — After five years of planning, Baxter Travenol Laboratories, Inc. last week switched over from the Burroughs Corp. mainframes on which it built its \$5 billion hospital supply business and routed all incoming orders to a group of IBM 3080 and 3090 mainframes.

For the first time, only IBM machines will run the business. Burroughs machines will be used primarily for off-line, batch-oriented applications. The two systems had been running in parallel for several months to ensure that the order-entry system would be unaffected by the change in hardware.

The conversion — one of the most extensive Burroughs-to-IBM conversions ever — cost Baxter Travenol \$14 million during a five-year period as well as untold man-hours to design and plan. "We didn't do anything without modeling what we were going to do," said Thomas Smith, vice-president of operations and facilities. "It was like playing chess. But it didn't happen overnight. We had four years to plan the new architecture." The initial design phase alone took 18 months, and IBM mainframes were not brought in until 1983.

According to the plan, all remaining Burroughs applications systems will be replaced by IBM systems by the end of 1987. "There is no Burroughs in our future," Smith said, referring to the company's central site strategy. Instead, all orders will be processed by twin IBM 3090 Model 200s, while all other applications, batch and on-line, will run on two IBM 3084 Model Qs. Two IBM 3081 Model Ks and an IBM 3083 will be used for testing and development. An IBM 4341 Group 2 will support VM for end users.

In the switchover, a series of IBM 3725 front-end processors, arranged in a matrix pattern of interconnections, replaced the Burroughs front ends. "We're using a matrix so that we can switch between processors in case of a hardware failure," said Robert Andersen, vice-president of the technology and telecommunications group.

#### All-IBM SNA environment

Eventually, Network Systems Corp.'s Hyperchannel product, the glue that held the Burroughs-IBM system together, will be removed, making Baxter Travenol's network a homogeneous all-IBM Systems Network Architecture (SNA) environment.

The changeover was the most dramatic part of a phased conversion from Burroughs to SNA architecture, one that began before American Hospital Supply, Inc. merged with Baxter Travenol in 1985.

Originally, the Burroughs systems

were purchased by American Hospital Supply, which used them to create a network of 12,000 order-entry terminals in hospitals and corporate sites around the world. The system was so effective at generating orders for intravenous equipment and other medical supplies that it attracted Baxter Travenol's attention — and sparked last year's acquisition.

#### Greater system capacity

But even before the merger, American Hospital Supply information managers had planned to move to IBM in their search for greater system capacity. The order-entry system now handles 40,000 separate orders a day, generating up to 1.3 million machine transactions daily, and more growth is anticipated.

Even in 1981, American Hospital Supply's capacity planners could see that Burroughs' product line, which then lacked the A series mainframes, could not support expected capacity needs. "Burroughs did not have the large systems we needed at that time," Smith said.

"If the A series had been available back in 1982, we would have thought twice about the conversion," he added.

This two-level computer room was recently expanded by 30,000 square feet to handle expected growth in systems and peripherals. There are 70,000 tapes in the tape library, two dozen IBM 3480 cartridge tape drives and an array of IBM 3290 plasma displays in the console and master terminal operator areas.

There is another, smaller computer room in the company's nearby Deerfield, Ill., corporate headquarters. There, Baxter Travenol had two more IBM systems, a 3081 Model K and a 3084 Model Q. Additional Burroughs systems — a dual-processor B7700 for software development and a dual-processor B7800 for testing — were housed in an older computer facility at American Hospital Supply's Evanston, Ill., plant. Evanston's Burroughs machines were shipped to McGaw Park.

At Deerfield, which effectively becomes a backup site in case of disaster, Baxter Travenol will run one IBM 3090, one 3081 and a 3084 Model Q. In the field are 180 Burroughs-compatible Four-Phase Systems, Inc. minicomputers — which will be replaced by 2,000 IBM Personal Computer ATs — in addition to the 10,000 existing teletype-writer terminals.

One key to the changeover was the order-entry system's existing Hyperchannel network, which was put in place to support burst data transfer rates of up to 52M bit/sec.

Hyperchannel also has the ability to talk to computers with incompatible architectures.

Because of this attribute, Hyperchannel allowed information systems managers to move the IBM machines into the backfield of the order processing system without ever turning the network off. It was a key move in the strategic plan to redesign the system.

The front-end Burroughs DCP processor was then able to route some orders to Burroughs and some to IBM.

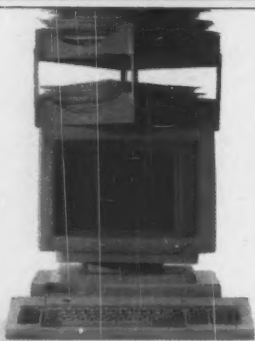
With the conversion completed, however, Hyperchannel will be removed in favor of IBM's Channel-to-Channel Interconnect. The resulting SNA network will run at speeds up to 23M bit/sec.

As for operating systems, IBM's MVS/XA will become the dominant environment, while VM will support end-user data base query applications within the company. Information center queries and other interactive applications will still run under VM, Smith said. On the IBM 3090s, the IMS data base management system and CICS will be key products, although the use of DB2 will begin to expand for data base queries.

#### Conversion not over yet

Although order processing has been changed over to IBM, the conversion process is not over yet. Selected Burroughs applications, including financial management applications and sales and marketing analysis software, will continue to run off-line.

But the focus of Baxter Travenol's business is on-line transactional pro-



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| <b>Services:</b> Health care consulting for hospitals and medical centers, including information management software.   |
| <b>Employees:</b> 61,000 worldwide  |
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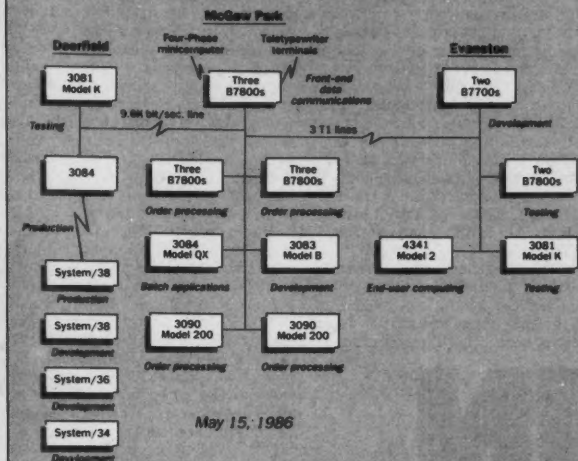


## NEWS

JEFF BABINEAU

## Baxter Travenol Laboratory

Illinois network configuration



After the switch to the IBM network, the three Burroughs B7800 complexes are removed from on-line operation in McGaw Park. An IBM 4341 Group 2, used to support end-user applications, was moved from Evanston to McGaw Park, as was an IBM 3081 Model K. By late 1987, all remaining Burroughs off-line applications will have been converted to run on IBM machines.

McGaw Park will end up with two IBM 3090 Model 200s running MVS/XA, one IBM 3084 Model QX and one IBM 3081 Model K running MVS/XA, an IBM 3083 and an IBM 4341.

Deerfield will have an IBM 3090, 3081 and a 3084 Model Q. Four IBM 3725 front-end processors will receive all incoming network requests.

In the future, information systems managers anticipate using an IBM 3081 to replace the IBM 4341 dedicated to end-user computing under VM as well as replacing some of the IBM 3080 machines with IBM 3090 machines.

Information provided by Baxter Travenol Laboratory

cessing — an area that demands the correct selection of strategic IBM products. The on-line network, which also supports 500,000 phone calls a year, is so important to Baxter Travenol's business that the telecommunications group has a \$21 million annual budget, a fifth of the information systems division's \$106 million annual budget.

To ensure that Baxter Travenol chose correctly — and the account is one of IBM's largest in the Chicago area — IBM was more than helpful in planning the conversion. For one thing, it has allowed Baxter Travenol's top information systems managers entry into IBM research labs for preliminary reviews of the proposed IBM network architecture.

"We were concerned about how we were going to flow data through the system," Andersen said. "We went to a number of IBM labs, including ones in Santa Teresa, Calif., Raleigh, N.C., and Yorktown Heights, N.Y. These sites are, respectively, a software facility, a communications

facility and the primary research lab for IBM."

The trips, Andersen said, were productive. "We got some help from

"

*'The conversion was like playing chess. But it didn't happen overnight. We had four years to plan the new architecture.'*

— Thomas Smith  
Baxter Travenol Laboratory, Inc.

IBM in selected areas, such as data base design, intermachine connections and telecommunications, and IBM's direction on PC products, particularly the Token-Ring." Still, Baxter Travenol's information services staff carried out most of the code conversion, translating Burroughs

Cobol to IBM Cobol.

Baxter Travenol made a point of training its Burroughs operators and programmers to work in the IBM environment and prides itself on being able to retain nearly all of its Burroughs-trained staff.

When American Hospital Supply and Baxter-Travenol merged, each had about 450 information systems staff members. Today, about 250 are in operations — 120 of them in technology and telecommunications and 24 working with the master terminals that run the systems. The rest are programmers and planners.

Few have been lost to attrition or to labeling. "Three years ago, we began a massive training program to bring Burroughs people over to IBM technology," Smith said. "And now, some of our best-trained IBM people are those who came over from the Burroughs side of the house."

Bozman is a Computerworld contributor based in Chicago.

## Burroughs boosts performance of A 10 line

### Institutes MCP/AS as mid-range standard

By James Connolly

DETROIT — Instituting the MCP/AS operating system as a standard feature on its A 10 mid-range systems, Burroughs Corp. last week claimed to provide users with an average 20% performance gain on new A 10 models.

The company said the performance boost in the A 10 X models comes from a memory management feature in the operating system that allows the system to view all memory as a single, monolithic area. The A 10's earlier operating system, MCP, limited a program or data area to 6M bytes and required the CPU and operator to manage the partitioned memory.

A Burroughs spokesman said users with relatively complex programs will recognize the greatest performance gains with the reduction in memory management overhead.

With the introduction of the A 10 DX and A 10 FX uniprocessors and the A 10 HX dual processor, Burroughs is discontinuing the year-old A 10 D, A 10 F and A 10 H on Nov. 30. The spokesman said, however, that the older models can be upgraded to the X models with the addition of MCP/AS. The operating system and microcode changes can be added through a diskette, according to Burroughs.

The company claimed that MCP/AS allows direct addressing of 24G bytes of real memory. MCP/AS had been offered as an option when the A 10 was announced last year but was made available only recently.

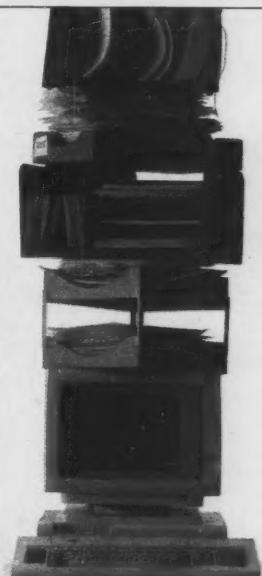
The A 10 is software compatible

with other Burroughs A series systems and the older B5000, B6000 and B7000 systems, according to the vendor.

"The performance gains improve the price/performance of the A 10 family, positioning them to aggressively compete with the IBM 4381 series and other mid-range mainframe offerings," said Fred R. Meier, Burroughs vice-president of corporate program management.

Prices for the X models are the same as the original A 10 models. Users of the older A 10s can upgrade by ordering the new operating system for the same monthly fee as MCP, which ranges from \$2,025 for the A 10 D to \$3,075 for the A 10 H, Burroughs said.

Purchase prices for the systems start at \$410,000 for the A 10 DX, \$580,000 for the A 10 FX and \$962,000 for the A 10 HX.



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## NEWS

## Users unmoved by DEC efforts to bar VAXBI connections

### But exhibitors see closed architecture as obstacle

By Jeffrey Boeler

SAN FRANCISCO — Attendees and exhibitors at last week's Dexpo West '86 conference differed sharply in their reactions to Digital Equipment Corp.'s efforts to bar selected foreign peripherals from attaching directly to the firm's VAXBI bus.

Some of the exhibitors, all of whom make products that are compatible with DEC processors, privately voiced deep concerns about the bus and the closed architecture it embodies. They interpret the VAXBI as a

bold attempt by the Maynard, Mass.-based vendor to restrict competition in the market for DEC-compatible accessories, especially storage modules.

The most glaring exceptions to the above rule were the small class of Dexpo exhibitors to which DEC has granted special dispensation to plug their products directly into the year-old bus. Without exception, those vendors have gained the larger company's blessing because they sell wares for which DEC currently has no interest in supplying a competing alternative.

But although some of the latest Dexpo West exhibitors clearly view the VAXBI as an obstacle or a threat, many users regard it as neither. At

worst, they expect it to pose only a minor inconvenience to which they can readily adjust without having to sacrifice much either in the way of functionality or price.

"We don't currently have any systems that use that particular bus," said Phillips Elliot, vice-president of administration at the Kansas City Star Co. "I assume that if we ever needed to move from our current VAX systems to one that has the new bus, we'd be able to get into it just by obtaining the right kind of interface."

Another reason the VAXBI's closed architecture has stirred so little excitement among many users is that falling hardware prices have

somewhat undercut the edge that rival peripherals have enjoyed over DEC. "Only a few years ago, if DEC's products were undersold by another company, the price difference could be significant," said Sonny Monosson, president of American Computer Group, Inc. and long-time DEC observer. "But today, hardware prices are so low that even if a DEC storage product has a lower capacity than one of its competitors, all a user has to do is buy another drive."

Not everyone, however, shares Monosson's views. A vendor representative who asked not to be identified claims to have witnessed quite a few users complaining bitterly about DEC's VAXBI strategy during last week's DEC User Society (DECUS) meeting, which was held concurrently with Dexpo. DECUS sessions were closed to the press, but the dissent he allegedly observed in private was little in evidence among attendees on the Dexpo show floor.

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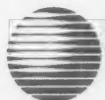


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## Symbolics cuts processor fees

By Rosemary Hamilton

CONCORD, Mass. — Symbolics, Inc. last week announced a round of price cuts in what it said is an effort to broaden the market appeal of its symbolic processing systems.

"For years, this market was dominated by Symbolics; now it's increasingly competitive," company spokesman James Neumann said.

Three models in the Symbolics family of processors were reduced in price by an average of 30%, and memory board prices were cut by up to 36%. Along with the price cuts, the vendor announced three new system configurations that support additional storage capacity.

The Symbolics 3610 AE, which was introduced last April with a \$44,900 price tag, was cut to \$29,900. It boasts up to a 40% performance increase over the previous low-end model, the 3640.

Two of the new configurations are expanded versions of the 3610 AE, which comes standard with 4M bytes of main memory, a 190M-byte disk drive and a runtime-only version of the general Release 7.0 software. The 3610 AE-2, which costs \$35,500, includes a second 190M-byte disk drive. The 3610 AE-3, priced at \$39,000, includes the two disk drives and a tape cartridge drive.

The 3620 E, an entry-level development system, was reduced in price to \$35,900 from \$49,900, and the 3620 D, an enhanced version of the 3620 E, now costs \$45,900 instead of its original price of \$60,700.

The third new configuration in the Symbolics line is the 3650-190 Base system, which is a 3650 with a 190M-byte disk drive. It costs \$56,900.

The memory board price reductions concern the Mem1-1, a 2M-byte board that now costs \$3,900, down from \$6,900; the Mem2-2, a 4M-byte board that had cost \$10,900 and now costs \$6,900; and the Mem2-1, an 8M-byte board that was reduced from \$19,900 to \$12,900.



## NEWS

## Palladian introduces expert system for manufacturing procedure analysis

By Rosemary Hamilton

CAMBRIDGE, Mass. — Palladian Software, Inc. last week rolled out an expert system software package designed to help manufacturing executives analyze current procedures and plan more efficient operations.

The Palladian Operations Advisor, which runs on both the Symbolics, Inc. and Texas Instrument, Inc. lines of artificial intelligence hardware, sells for \$139,000. It is scheduled for availability at the end of November.

"The best I can tell, there's nothing out there that really competes with it," said Carol Weismann, editor of "Artificial Intelligence Markets," a newsletter published by AIM Publications, Inc. "The only drawback, really, is the price tag. It's designed as a single-user system, so it's pricey."

Currently installed at approximately 12 alpha sites, according to Palladian, the software is written in the LISP programming language and reportedly incorporates a number of AI techniques. The system applies a user's manufacturing data to its knowledge base, which includes rules governing manufacturing operations and the logic underlying the relationships between procedures.

By applying a user's data to this knowledge base, the system can then point out flaws in a manufacturing procedure and suggest other, more

efficient methods, the company said.

At Champion International, Inc., a paper products company where the software is currently under review, director of management science Hank Wells cautiously praised the tool. "We haven't taken it far enough to find if it's a viable application, but we're interested and excited about the technology," Wells said. It is "probably as good as the data we had to verify it with."

"It's proved to be a very effective package for identifying things, like where to expand and where to add machinery," said Demos Angelides, senior consultant in the systems and automation department at McDermott International, Inc.'s New Orleans headquarters. Since July, Angelides has used the software at one of McDermott's pipe manufacturing facilities.

Before the software can be used for analysis purposes, a user is required to input all pertinent data into the system. According to Palladian product marketing manager Charles Burger, this process takes an average of two weeks.

Currently, the system does not interface with any data base products. As a result, users must input the data manually. "Ultimately that will be a drawback, but they're talking about an interface product," AIM Publications' Weismann said.

## Desqview supports 80386

### Quarterdeck releases applications manager

By Peggy Watt

SANTA MONICA, CALIF. — A version of the Desqview applications manager that will support the protected mode of Intel Corp.'s 80386 microprocessor was announced last week by Quarterdeck Corp.

Version 1.3 of Desqview takes advantage of the virtual 80386 machine architecture, enabling users to simultaneously run as many as nine large applications in the segmented protected mode memory as if they were running on separate systems, according to Quarterdeck.

The \$99.95 release supports the Deskpro 386 from Compaq Computer Corp., which runs Microsoft Corp.'s MS-DOS 3.2. Virtual mode accommodates applications that surpass the 640K-byte barrier of current versions of MS-DOS and IBM's PC-DOS.

"It acts as a virtual machine manager and enables any application to run in protect mode under Desqview," said Therese Myers, Quarterdeck's president. The manager could be quickly suited to Compaq's Deskpro 386 system, because it handles expanded memory similarly to Desqview's interaction with the AST Rampage board, with its Enhanced Expanded Memory Specification, a superset of the Lotus/Intel/Microsoft

### Expanded Memory Specification.

The latest version of Desqview will run on any IBM Personal Computer or compatible but will take advantage of the 386 virtual mode only on the Compaq system, she added. However, at least one more version will be designed to accommodate other 386-based systems, and Quarterdeck will make revisions for any IBM 80386-based system, Myers said.

The nine-application maximum is arbitrary and could be expanded in a future version, she added.

The user interface is indistinguishable from running Desqview on other systems, "except that the 386 is also faster," she said.

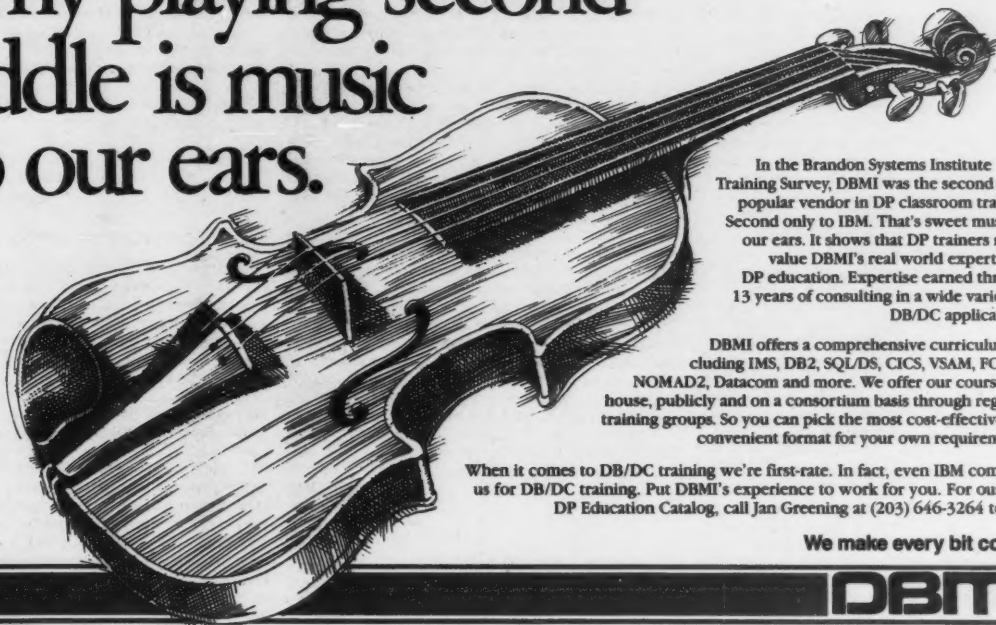
The release also reportedly improves efficiency of high-speed, 48K to 96K bit/sec. communications and support for Microsoft Word and new mouse input devices from Microsoft.

Desqview was released in 1985 as an enhanced program compatible with Topview, IBM's as yet little-noticed operating environment. Desqview runs all Topview-aware applications.

Quarterdeck also recently announced the first of a line of Desqview applications that take full advantage of multitasking capabilities, including a calendar, calculator, pop-up notepad and communications package.

Current registered users of the program may upgrade to Desqview 1.3 for \$19.95.

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# VIEWPOINT

## EDITORIAL

### Crime stoppers

The statistics tell a troubling story: Nearly 150 major corporations admit, in an American Bar Association survey, that they have lost several million dollars to computer criminals. Only one in 20,000 computer criminals ever goes to jail, say FBI estimates, and a vast majority are insiders — employees who have the greatest ability to do damage.

Last week the U.S. Congress went a long way toward helping computer professionals combat this near epidemic. In two new laws — the Computer Fraud and Abuse Act and The Electronic Communications Privacy Act — Congress broadened the federal government's jurisdiction over such criminal acts. Once the two bills are signed into law by President Reagan in the next few days, it will be a federal crime for trespassers to observe or alter data stored in a computer located in another state, to intercept electronic mail or electronic funds transfers or to distribute stolen passwords for criminal purposes.

Since a majority of computer crimes are interstate, the legislation is long overdue and comes after years of often intense political debate on computer security and privacy issues. Despite its tardiness, Congress is to be commended for crafting the new statutes with care (they attack only interstate and federal-interest crimes and leave the rest to the states) and without the hysteria that often accompanies criminal legislation.

We can hardly expect that each provision of the new laws is well-enough designed to give prosecutors precisely the tools they need to combat computer crime without impinging on civil liberties. That will be tested in future court cases, and, when flaws become apparent, Congress should act quickly to remedy them.

Nevertheless, the laws should be a considerable deterrent to computer criminals, who now face prosecution under federal and state statutes. That is good news for computer professionals, struggling to secure their systems against both inside malcontents and outside intruders. Also good news is the fact that the new laws help to make clearer how the intangibles of computing — such as data and programs — are protected under federal law.

Even as the computer community gains stronger legal protections, those who use and manage computers are also being asked to take on greater legal responsibility for the safety of their organizations' data and computer services. In California, TRW, Inc. is in court defending itself against charges that it did not adequately protect its credit files. New York's Citibank N.A. recently lost a civil action charging, in part, that it had not provided sufficient security for its automated teller machines.

Some legal observers believe that, in fact, computer law will increasingly emphasize the responsibility of computer-using organizations to develop better security measures — or to submit to government regulation to achieve the same end.

This is one more strong argument for computer professionals to actively support and implement existing computer security tools, including the latest computer crime legislation. To do so — despite the difficulty of the undertaking — will ensure the ultimate responsibility for computer security within an organization rests precisely where it should, with the professionals, rather than with state or federal government officials.



## LETTERS TO THE EDITOR

### The truth about benchmark tests

William Inmon's article, "A new measure of software speed narrows DBMS buyer's choices" [CW, Sept. 8], offers more than it can deliver.

The Maximum Transaction Arrival Rate (MTAR) is just as idiosyncratic as any other metric: There is no "American Standard Transaction," and, like any other benchmark, results will be determined by the job mix.

The author ignores communications overhead, but in the real world there are a lot of full-screen updates. For some applications, the bottleneck will be the communications software rather than the data base software.

The author arbitrarily excludes systems running on multiple mainframes. As long as an integrated data base is used, such systems are functionally equivalent to a single system. If excessive intersystem communication is required to maintain data base integrity and share the load, this will show up in the MTAR; if not, why exclude such a complex?

The chart of MTAR for various systems is a comparison of apples and oranges. Some of the numbers are measurements and some are projections. For those that are measurements, a different transaction set was used for each system.

This article does nothing to alter the sordid truth about benchmarks, which is, "Tell me the answer and I'll construct a benchmark to prove it." If you want an honest and meaningful comparison, you will have to do the work of putting together a script that is representative of your workload, current or projected. If you sue someone else's comparison, you will be in for some surprises once you go on-line with the selected system.

Seymour J. Metz  
Annandale, Va.

### Clarifying Ideal 1.3 recompilation

I would like to clear up some of the issues discussed in the article entitled "Ideal 1.3 requires recompile" [CW, Sept. 22]. We have received a number of calls from our clients expressing concern that the story did not accurately represent their experience with Ideal 1.3 and requested that Applied Data Research (ADR) clarify the issues.

Ideal 1.3 does not require recompilation of programs and is 100% upwardly compatible from earlier releases. Users can execute Ideal programs

compiled using prior releases under Ideal 1.3 and can even mix programs compiled under various Ideal releases. Also, almost half of the substantial performance improvements introduced with Ideal 1.3 can be realized without any intervention.

However, as with Cobol, PL/1 and fourth-generation languages that offer compilation for the sake of performance, ADR recommends recompilation using Ideal 1.3 in order to fully realize certain performance benefits of the new release. Users currently satisfied with their performance levels may decide not to recompile their Ideal programs.

We believe ADR's policy of providing optional recompilation to achieve performance enhancements while still providing 100% upward capability for release level migration is exemplary of established industry practices for the support of programming languages.

Richard L. Kauffman  
Vice-President  
Applied Data Research, Inc.

### Give advertisers credit when due

Imagine that! You thought the graphic image in our ad for Decision Data Computer Corp. (DDCC) was the headline. In fact, it was considered the vehicle to get people to read the headline, which in the case of this ad was, "The largest independent supplier of System 3X compatible peripherals wants to be your data processing partner."

Someone told me recently that there is really only one kind of bad public relations and that is no public relations. When I read your article, "Computer ads: The cute, the pompous and the obscure" [CW, Sept. 1], I tried to hold onto that theory.

However, if you are going to take stands on specific advertisers and their advertising campaigns, why not give those advertisers credit?

As creative director of DDCC's account, I would have been more than pleased to see its name after the reference — regardless of the fact that it was misrepresented. After all, we made sure their name was in the "cute" ad. Of course, we only did that in case a reader by some stroke of luck read the entire ad. The chances of that happening are pretty slim, however, since the entire DDCC campaign follows all the basic rules I learned when I did my last buggy whip space ad.

Elizabeth F. Harris  
Harris-Edwards, Inc.  
Philadelphia



# VIEWPOINT

## Privatization and treating information as a commodity

One of the hot issues in the federal government right now is privatization — moving government-run services to private industry, either by contracting the jobs out or selling the operation to the highest bidder to run as a business.

It is hardly a new concept. In fact, The Pony Express was begun because the federal government was not ready to begin delivering mail west of the Mississippi. More recently, the Reagan administration has been prodding agencies to review more functions for commercialization.

The Office of Management and Budget (OMB), for instance, wants to target certain commercial activities, including data processing, for direct conversion to outside contract — in many instances, says Rep. Gary L. Ackerman, D-N.Y., chairman of the Subcommittee on Human Resources, and the Post Office and Civil Service Committee, without any in-house competition or cost study.

### Administrative support shops

In several pilot projects, the administration already supports managers who are becoming owners of commercialized operations providing services to the government itself. These include "administrative support" shops at one agency. The strategy, according to Constance Horner, director of the U.S. Office of Person-

nel Management (OPM), could be extended to cover many types of labor-intensive operations carried out in critical program divisions of every department and agency.

The key to this program is the OPM's proposed Federal Employee Direct Corporate Ownership Opportunity Plan (FED CO-OP). In FED CO-OP, majority shares of a company are retained by the highest bidding firm competing for federal work. But up to 49% of the firm's ownership is held by current federal employees. Employees not only have the opportunity to remain in their jobs, but they become part owners as well.

That may not work. Even before a FED CO-OP gets rolling there is evidence that the number of federal employees involved in information systems and telecommunications activities is down from past levels.

Bob Dornan, vice-president of Vienna, Va.-based Federal Sources, Inc., a consulting firm specializing in helping companies locate and win federal contracts, says he has found that the amount the federal government is spending on staff information systems personnel is down approximately 21% of its total information resources management budget over the past year or so. "That's about half of what the commercial world spends on its personnel, which leads me to believe that

the government has already significantly contracted out many of the functions that private companies do internally," Dornan says.

Also, a recent survey by the General Accounting Office found private businesses achieved savings over federal in-house performance by using leaner staffs at less cost. Approximately 53% of contractors paid wages lower than the government. (Interestingly enough, 21% paid better.)

OPM's Horner believes another important feature of FED CO-OP is that each program operating under the proposal is beefed up by providing the winning contractor an exclusive agreement for up to three years.

John R. B. Clement, director of governmental activities at the American Federation of Information Processing Societies (AFIPS) in Reston, Va., has a problem with privatization and with the exclusivity part of the FED CO-OP plan in particular. Clement points out that the federal government has already said it would like comments on privatization of the National Technical Information Service, which disseminates such things as census data, requests for proposals for government contracts, etc.

"We see some potential problems with this because none of this information is copyrightable," says Clement. "How do we prevent giving

someone in the private sector a potential monopoly on information?"

Clement says he is seeking funding to develop a study of privatization of government information systems.

Views on privatization range all over the lot, but support for the concept in general is widespread, so much so that it is likely to grow in one form or another. One of the arguments in its favor is cost cutting, particularly in the post-Gramm-Rudman-Hollings period. Some feel that privatizing federal services will get government out of businesses where it has no business.

### Privatization opportunities

The President's Private Sector Survey on Cost Control, also known as the Grace Commission, for example, recommends 22 privatization opportunities that it believes could save \$28.4 billion over three years.

Fortunately, or unfortunately, the issue is much more complex as it relates to information technology. While the Office of Technology Assessment (OTA), a research arm of the Congress, has not conducted any formal studies of privatization, there are people within the OTA who feel strongly that privatization is an extension of a federal government effort to make everything cost based.

As they see it, information is being viewed as a commodity when the Constitution provides for different treatment. Changes, they feel, would necessarily call for a much different, and not necessarily healthier, regulatory framework than currently exists.



By RON SCHNEIDERMAN

Schneiderman has been covering the computer and electronics industries as a reporter and editor for more than 20 years.

## The magic of the expert system: Putting productivity first

With the commercialization of expert systems has come a demystification of what its practitioners do and how they do it. To some it appears that much of the expert systems business is founded on a terminology scam in which conventional techniques have been relabeled, recast and repriced. In fact, the task of developing an expert system is distinct from the experience of developing a conventional system. What makes this so?

One look at the development of an expert system reveals that something is fundamentally different. An expert system usually begins as a small prototype solving a miniature version of the problem. Progress is made by incorporating a very large number of small improvements, each extending the system's capability.

This approach is often referred to as either iterative or incremental prototyping. But whatever its name, the process is unlike any formal prototyping method. It sharply contrasts with most methodologies for building conventional systems.

A 20-year veteran of scientific and business computing technology, Curtis is now vice-president at American Management Systems, Inc., Corporate Technology Group.

More familiar systems are usually developed under a structured framework of formal steps, with the objective of fully specifying in advance every nuance of the work to be done. The expert system developer is not a prisoner of this structure. These developers actually expect to learn more about how their system should be built as they build it.

Even further, when they conclude that the system should be built differently, they usually start over. As a data processing manager, haven't you ever wanted to take this approach? But when was the last time you thought you could propose it and keep your job?

There is a lesson here that is beginning to impress some of industry's giants. For example, at the recent conference on Expert Systems for the Financial Industry, held in New York, an executive of American Express Co. announced that the firm is developing a major expert system to help process credit authorizations. Many people knew this.

What most did not know is that American Express is allowing this application to be developed outside its comprehensive, published system

development methodology. The American Express spokesman and other industry sources described the efforts as on plan, on cost and very impressive. Is it possible that we are seeing the beginning of a more flexible, effective approach to developing computer applications? Perhaps.

Another lesson can be learned from observing the exceptional tools with which expert systems developers work. Is the magic in the tools? Certainly some of them are highly specialized and esoteric, facilitating, for example, someone's favorite method of knowledge representation.

The lesson, however, is about a property consistently found in all of these tools. As a technology, expert systems development tools embody the most impressively effective program debugging capabilities available — and by a wide margin. It is no exaggeration to claim that these facilities are to mainframe Cobol debuggers what the 747 is to a go-cart.

Why? Contrary to what many believe, even their developers rarely claim that there is any artificial intelligence in the debugging tools. In large part, these facilities were developed by academics and research-

ers who were often not skilled in tedious debugging techniques. Today's expert systems developers continue to reap the benefits of those early AI researchers' selfish concern for their own productivity.

There is no magic in these tools; instead, they embody a willingness to put development productivity first; trade computer resources for increased effectiveness; and get programs working quickly. Consider this the next time you see anyone wading through a memory dump.

Then find an expert system development firm with a good track record in your industry and set it the task of developing a modest application. If it turns into something useful, consider it a windfall.

But be sure that you and your systems development manager carefully observe what the developers do and how they do it. Identify the techniques that are different from your development process and find ways to introduce those techniques on a new project.

Perhaps you will find that project spending more time acquiring and using new tools, redesigning without fear and thinking more about the problem to be solved than the processor. Let this project apply some intelligence, artificial or not, and stand back.

### READER'S PLATFORM

By GARY CURTIS



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# SYSTEMS & PERIPHERALS



## HARD TALK

Jeffrey Beeler

## Play waiting game for 3090

Some user organizations are growing so rapidly in their demands for computing power or are so close to exhausting the capacity of their existing systems that they have little choice but to order an IBM 3090 forthwith. To do otherwise would be to court serious trouble.

But for the many other companies whose needs for a processor upgrade are somewhat less urgent, Annex Research, Inc. founder Bob Djurdjevic offers a bit of friendly advice.

Djurdjevic says that whenever possible, defer planned purchases of 3090s until the second half of next year; if the need for additional capacity proves unavoidable, buy a 3080 to tide yourself over.

In several months, prices for IBM's Sierra machines are expected to be quite a bit lower than they are today, a development that promises hefty savings for users who can afford to be patient.

At first glance, Djurdjevic's forecast of declining mainframe prices may seem overly optimistic. After all, the head of IBM's European operations has already gone on record as saying the company would like to see an end to the frenzied discounting and aggression that have recently characterized large-scale CPU pricing.

In the short run, IBM's desire for increased price stability is almost guaranteed to be fulfilled. Neither Amdahl Corp. nor National Advanced Systems Corp. (NAS), IBM's chief rivals at the

See **PLAY** page 26

Beeler is a Computerworld West Coast correspondent.

## Fault-tolerant Sequoia ships after two-year delay

By Rosemary Hamilton

MARLBORO, Mass. — Two years after its introduction, Sequoia Systems, Inc.'s fault-tolerant computer for on-line transaction processing applications is ready for shipment.

The Series 100, with an entry-level price of \$199,500, is based on the Motorola, Inc. 68010 microprocessor and runs under the AT&T Unix System V.2 operating system.

According to a company spokesman, shipment of the Series 100 was delayed because of further product development and refinement as well as management changes at Sequoia.

According to Sequoia Vice-President of Marketing and Sales Arthur Campbell, the first commercial customer, Digital Analysis Corp., a turnkey systems supplier in Reston, Va., will receive its Series 100 next week. Digital Analysis plans to resell the

system bundled with Unify Corp.'s Unify data base management system and related applications packages to on-line transaction processing customers. Starting price will be approximately \$500,000, a Digital Analysis spokesman said.

Sequoia first announced its product, then called the Sequoia System, in September 1984. At that time, the system was based on the 68000 chip and had a starting price of \$290,000, almost \$100,000 more than it sells for now. The system was installed at a few beta sites, including Sperry Corp., but was not sold commercially, according to a company spokesman.

"We've done some things in the way of further development and refinement," spokesman Howard Johnson said. "Then the company went through a change in management. Some systems went out for evaluation, including one at Sperry. I can't

See **FAULT** page 26

## Burroughs repackages A 3 line

### Aims to boost memory without price increase

By James Connolly

DETROIT — Burroughs Corp. has repackaged its A 3 line of entry-level systems with configurations that provide more memory without price increases. The company also raised prices for some upgrades within the A 3 line.

A Burroughs spokesman said the base configuration for the A 3 D, A 3 E and A 3 F models will now include 6M bytes, rather than the previous 3M bytes, of memory. The maximum memory remains at 12M bytes for the A 3 D and A 3 E and at 24M bytes for the A 3 F.

What the company called a typical configuration of an A 3 D with 6M bytes of memory, a user interface processor, tape and printer controls, a 123M-byte disk drive and one operator display terminal

costs \$95,500.

The previous price for that configuration was \$113,000. Additional increments of 3M bytes cost \$18,000 each, spokesmen said.

### Disk drive prices cut

Burroughs also cut the price of a 123M-byte B 9493-168 disk drive, which was designed to be installed in the A 3 processor cabinet, from \$10,500 to \$7,500, according to the vendor.

The spokesman also reported that the prices of some Burroughs upgrade processor kits have been increased. He said a typical kit, such as the A 3-ETF, which provides an upgrade from an A 3 E to an A 3 F, now costs \$30,000 rather than the \$7,500 it cost earlier.

A Burroughs executive said all of the pricing changes are intended to enhance the competitiveness and overall performance of each model with the A series family.

## INSIDE

Keeping 3480 tape drives running/21

Tektronix adds features, drops prices of color graphics terminals/21

## NEW THIS WEEK

■ Mitsubishi adds color printer/plotter system to its G500 Color Graphics line printer

■ SBE offers Multibus board

■ For more on these and other new products, see pp. 115-139.

## INSTANT ANALYSIS

"Data General Corp. and Wang Laboratories, Inc. won't represent a real competitive threat to Digital Equipment Corp. unless and until there is a real boom in the industry. Right now the boom is highly uncertain."

— Marc Schulman, senior technology analyst, Salomon Brothers, Inc.

## Intel, Flexlink introduce IBM-VAX channel-speed link

### Bridges SNA, Decnet, allows fast file access

By James Connolly

PHOENIX — Setting their eyes on DP shops that run IBM and Digital Equipment Corp. systems, Intel Corp. and Flexlink International Corp. last week introduced a hardware and software package designed to provide channel-speed connections between IBM mainframes and DEC VAXs.

The package was announced under a joint marketing agreement between Intel and Flexlink, which is a participant in the IBM Marketing Assistance Program for resellers.

The hardware portion of the package is Intel's 9750 Fastpath, which is

an Intel Multibus-based controller that in the past has allowed Ethernet and Multibus connections to IBM systems. Flexlink is providing the connectivity software for the VAX links.

### 'Unique benefit'

"The unique benefit of this Fastpath and Flexlink connection is that now an IBM/DEC user has a single-vendor solution available from a major supplier of IBM channel technologies. This agreement allows Intel to deliver complete IBM mainframe connectivity solutions to the marketplace," said Roger Thomas, general manager of Intel's Systems Interconnect Operation.

Thomas said Fastpath will support direct channel connectivity at 3M byte/sec. between IBM mainframes and VAX minicomputers and that us-

ers at terminals on either system can log on and run applications in emulation mode on the other system.

He added, however, that what the user sees on his terminal appears to be his original system.

According to Thomas, users can share high-speed access to data files, initiate tasks on each other's systems and share peripherals, such as laser printers, without what he called the throughput constraints of communication-based links such as gateways.

The products also combine to act as a bridge between IBM Systems Network Architecture and Decnet networks.

### 'Market needs high-speed link'

David E. Hartman, Flexlink president, commented, "We entered 1986 knowing connectivity would be a hot

topic. The Intel agreement and our participation in the IBM Marketing Assistance Program reinforce our belief that the market needs a high-speed, versatile software link between dissimilar processors and networks."

Fastpath can be customized to support up to four simultaneous connections in addition to the VAX-IBM link. Thomas said that those other connections might allow links to systems on Ethernet or Manufacturing Automation Protocol networks, for example.

The Fastpath control unit was designed to fit into a standard 19-in. rack. The Fastpath-Flexlink combination is scheduled to be available in January at prices ranging from \$80,000 to \$130,000, according to the vendors.



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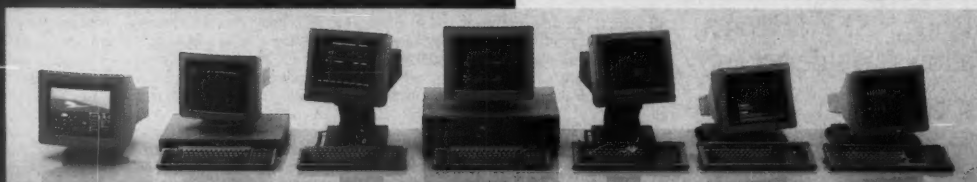
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## SYSTEMS &amp; PERIPHERALS

## SHOP TALK

## Cartridge facts, fancies

By Pat Rizzello

The IBM 3480 Magnetic Tape Subsystem is the latest development in the data storage industry. Data centers have welcomed the cartridge with open arms.

Tape managers thought the subsystem's increased reliability, space savings and faster processing would eliminate all their tape library concerns. All their data storage problems were solved.

If you believe that, let me toss in Francis the talking mule, Mr. Ed and the tooth fairy.

I am not knocking the potential of the 3480s. On paper they look great, and user satisfaction is good. But I am concerned with the future performance and management of 3480 libraries. The 3480s are not going to solve problems with insufficient scratch supplies or eliminate misfiles.

They will not survive hot chocolate and marshmallow spills, stop programmers from swiping backup copies or encourage prompt return of cartridges from outside data centers. These issues have to be addressed individually and resolved by library management on a preventive basis.

The adage, "If it ain't broke, don't fix it," could apply to the headlong rush toward and immediate acceptance of the 3480. But not all data centers are converting; some have well-oiled machines that will not justify the expense given the benefits.

Some are taking the wait-and-see approach. Many data centers have no alternative to the 3480. They are out of space and have unreliable media and poor drive performance. Toss in operator mishandling and stir in a poor environment and a pinch of low-bid-wins, and you have the recipe for media problems.

Data centers have a major investment in the cartridge system. When the 3480's toxic and reliability issues are laid to rest, the cartridges still face the gauntlet of day-to-day operations in the data center. Media libraries are a critical component of the data processing industry.

Here are a few suggestions to ensure a smoother library operation:

Since most major tape vendors  
See **CARTRIDGE** page 27

Rizzello is owner of Tape Library Consulting of Yardville, N.J., and sponsor of seminars on tape library management.

### CORRECTION

The correct backplane speed for Integrated Solutions, Inc.'s cluster compute nodes ["Unix-based nodes unveiled," CW, July 14, p. 44] is 20M byte/sec.

## Tektronix offers enhanced graphics terminals

### Targeted at CAD use, 4200 adds functionality

By James Connolly

WILSONVILLE, Ore. — Tektronix, Inc. has revamped its color graphics terminals product line with three terminals that the company said provide more functionality for prices beginning at one-third the cost of Tektronix's previous standard terminal.

The 4200 series of intelligent graphics terminals is targeted toward users running scientific and technical engineering applications such as computer-aided design (CAD) previewing, two-dimensional drafting and data analysis.

The entry-level terminal is the 4205, which costs \$2,495. The 4207 terminal costs \$3,995, which the company said includes the feature

set of the earlier 4107, such as CAD drawing, viewing and shop floor applications. The 4208 terminal costs \$4,995 and is targeted at applications requiring expanded memory and video output support.

#### DEC compatibility

The 4200 series is compatible with Digital Equipment Corp. VT100 terminals and will provide DEC VT220 compatibility and IBM 3179 emulation when equipped with an optional feature.

New features available on the 4200 series include a fine-pitch shadow-masked CRT with resolutions of 480 by 360 pixels for the 4205 and 640 by 480 pixels for the 4207 and 4208 terminals. The 4200 series also features a 60Hz noninterlaced refresh rate and the ability to display 16 colors from a palette of 64 colors.

Also available are features supporting downloading of custom char-

acters and a background copy feature that sends data to the terminal's system memory and then to a copier while allowing the user to continue to use the graphics.

#### More compact

Compared with earlier Tektronix terminals, the 4205 and 4207 are more compact, which the company said will make them appropriate for nonoffice environments such as assembly lines and manufacturing floors.

Company officials said that the 4208 is larger but designed for greater flexibility. It features additional memory and video output support, including camera systems and Tektronix monitors.

The 4208 is available now. The 4207 will be available this month, and the 4205 will be available by mid-November, according to Tektronix.

## Link introduces multiple-protocol terminal

By David Bright

FREMONT, Calif. — Link Technologies, Inc. is expected today to introduce a flexible terminal that it claims supports multiple protocols, concurrent communications with multiple host computers, interchangeable keyboards and three communications ports.

Designed to be used with a variety of multiuser and personal computers, the 14-in. MC3 is priced at \$399.

According to Link representatives, the MC3 supports ASCII, Digital Equipment Corp. VT100 and IBM Personal Computer emulations.

#### ASCII keyboards

An ASCII keyboard lists for \$150, an IBM Personal Computer AT-style keyboard is \$250 and an RT PC-com-

patible keyboard is \$275, according to the vendor.

Each keyboard contains 32 programmable function keys. For security measures, the keys on each keyboard can be disabled in setup mode or by remote command from the host computer.

The unit has two fully bidirectional RS-232 ports that can be independently configured. It is also said to feature a parallel printer port.

#### Simultaneous tasking

The two RS-232 ports allow users to simultaneously run tasks on different host computers through windowed partitions on the 44-line screen.

Users have the ability to hot-key back and forth between windows, ac-

cording to the vendor.

The printer port enables high-quality personal computer printers to be directly attached to the terminal without having to be routed through a PC.

#### Storage capabilities

The MC3 can store and display up to six 80-col. pages.

According to the vendor, a full range of embedded, nonembedded and character video attributes are supported in reverse background, blink, blank, underline and half density.

The terminal is said to incorporate the 256-char. IBM PC character set and features a 512-character downloadable soft font for custom graphics.

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## SYSTEMS &amp; PERIPHERALS

## Concurrent adds low end to supermini series

### Positions Model 3212 in VAX 8200 arena

By James Connolly

HOLMDEL, N.J. — Concurrent Computer Corp. has introduced a low-end member of its Series 3200 superminicomputer family, with claims that the system processes one million instructions per second.

The company positioned the 32-bit Model 3212 against competition such as the Digital Equipment Corp. VAX 8200. It is targeted at applications such as real-time data acquisition and control, on-line transaction processing and data communications ap-

plications. According to Concurrent officials, the Model 3212 provides real-time performance of up to 1.8 million Whetstone instructions per second using an optimized Fortran compiler.

The 3212 is based on Concurrent's earlier Model 3210 and runs the company's OS/32 as well as Concurrent's Xelos, which is based on AT&T Unix System V.2.

The system was designed to be hardware and software compatible with the entire Series 3200 product line, which ranges up to the 3280MPS multiprocessor.

Officials of Concurrent, formerly Perkin-Elmer Corp.'s data systems division, claimed that software de-

veloped on the 3212 can be transported to each of the other processors in the Series 3200 family.

The 3212 is available in either a 30- or a 56-in. cabinet. The company said the CPU can address up to 16M bytes of memory and more than 200G bytes of disk storage while supporting up to 64 users.

A basic configuration costs \$42,000 and is available immediately. That basic system includes 4M bytes of memory, 1K byte of cache memory, eight communication ports, a line printer interface and a system console.

The company said an OEM version is also available. That CPU is provided in an 18-slot chassis.

## Nixdorf CPU to consolidate mid-range line

By James Connolly

WALTHAM, Mass. — Nixdorf Computer Corp. last week consolidated the four mid-range models of its 8850 line of distributed data processing systems with the announcement of its 8850 Model 85.

The Model 85 is reportedly available in configurations ranging in price from \$48,000 to \$220,000. Company President Michael H. Anderson said that Nixdorf is consolidating the four mid-range models of the 8850 line into a single, flexible system. Those earlier models, the 35, 45, 55 and 65, will still be supported and are compatible with the Model 85, according to the company.

Other members of the 8850 include the Micro 5 for entry-level and departmental processing and the 32-bit 8855 Model 10 for what Nixdorf calls high-volume processing.

77

*'The 8850 now incorporates Nixdorf's standard packaging, which ensures continued price competitiveness.'*

— Michael H. Anderson  
Nixdorf Computer Corp.

The Model 85 was designed to support up to 32 terminals or workstations, as well as other peripherals such as bar code readers and printers. It runs Nixdorf's DPEX multilevel operating system.

Anderson said the new model uses Nixdorf's standard packaging. "With this introduction, the 8850 now incorporates Nixdorf's standard packaging, which ensures continued price competitiveness of our most popular models. In addition, the new model will increase compatibility of the 8850 family worldwide," he said.

The Model 85 can be placed in office environments. The cabinet can hold an autoloader tape drive, two 8-in. 132M-byte fixed disk drives, a 5¼-in. floppy disk drive, power supplies and controllers. The central processing memory unit is said to feature a 375 nsec access time.

Scheduled for shipment before the end of this year, a single cabinet consisting of a CPU, tape drive and disk drive costs \$48,000. A maximum configuration with four disk drives, two tape drives and 32 terminals costs \$220,000.

Nixdorf also announced five AT&T-compatible modems ranging in speed from 1,200 bit/sec. to 9.6K bit/sec.

The company also introduced a communication module for its Loan Management Information System. The Automated Loan Control Network module was designed to provide centralized data base control while maintaining branch flexibility.



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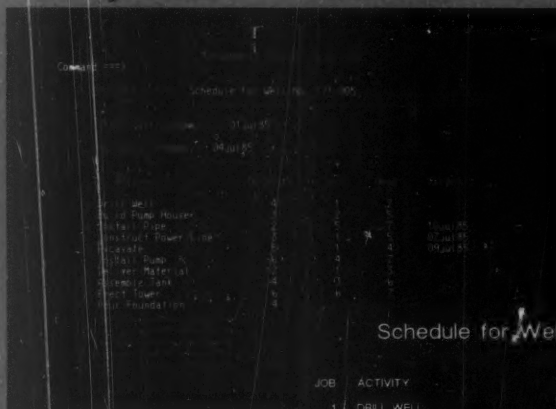
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| 7   | INSTALL PUMP         |
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## SYSTEMS &amp; PERIPHERALS

## Fault-tolerant Sequoia ships

From page 19

discuss that publicly, although I can say we haven't done a deal with them yet."

The basic Series 100 comes with two processor elements, two memory modules, each with 2M bytes of memory, and two I/O modules.

Each of the I/O modules contains its own Motorola, Inc. 68010 processor.

The redundant hardware is the basis for the system's fault-tolerant capability.

The system can be expanded to include up to 64 processor, memory and I/O modules.

According to Campbell, the maximum configuration of the system would be priced in the \$7 million range.

### Record management package

The Sequoia Transaction Oriented Record Manager, which is a software package for transaction updates and record management, will be offered for \$5,500, according to a company representative.

The package can be licensed for as many as eight processor modules.

Additional modules can be purchased separately to expand the system.

A processing module costs \$25,000, and an I/O module costs \$30,000.

Memory upgrades start at \$17,000, for which the user receives an additional 2M-byte module.

## Play the waiting game for 3090

From page 19

high end, is currently shipping 3090-class processors in sufficient volume to make much of a dent in Big Blue's installed base. As a result, the company can sell its products for pretty much what it pleases and still run little risk that its prices will be significantly undercut by some aggressive competitor.

But IBM's current absence of effective competition is destined to be short-lived. Starting next year, both Amdahl and NAS will greatly increase their U.S. shipments of 3090-scale CPUs, at which point the law of supply and demand will reassert it-

self in the mainframe sector.

As the number of IBM-compatible processors entering the market steadily swells, the machines' price per unit will inevitably fall. Moreover, to stay competitive, IBM will be forced to counter the decreases by trimming the prices of its own products as well. This sequence of events explains why IBM's hopes for long-term pricing stability are likely to be dashed and why Djurdjevic foresees yet another round of price cuts and substantial discounts beginning around mid-1987.

Although he declines to quantify the amount of the predicted reductions, Djurdjevic calls the future changes in IBM and IBM-compatible mainframe prices "not insignificant."

So for large users, the lesson is clear: Sometimes, the best way to save a buck is simply to sit back and wait for market forces to turn favorably of their own accord.

## Memory tool out for VAX

By James Connolly

HOPKINTON, Mass. — Claiming the ability for their product to sit directly on a Digital Equipment Corp. VAXBI bus, Clearpoint, Inc. introduced an add-in memory product for the DEC VAX 8200 and VAX 8300 minicomputers.

The Clearpoint VBIRAM is a memory upgrade subsystem in which 2M bytes of memory are on the memory controller and 8M bytes reside on each memory array board. The controller communicates with the array via the C, D and E connectors on the VAXBI.

Clearpoint officials claimed that the VBIRAM's ability to sit directly on the VAXBI sets a precedent for public access to DEC's proprietary bus. The memory product reportedly features up to 32M bytes of memory in five slots.

## Printer debuts for IBM minis

By James Connolly

RESTON, Va. — Infoscrite, Inc. has introduced a multifunction serial dot matrix printer designed for use with IBM's System/34, 36 and 38 minicomputers.

The Model 103X is the third Infoscrite printer designed to connect to the System/34, 36 and 38 processors using twin-axial cable. The printer reportedly has print speeds of 200 char./sec. in draft mode, 100 char./sec. in correspondence-quality mode and 40 char./sec. in an optional near-letter-quality mode. It also has standard 72 by 72 dot/in. and 144 by 144 dot/in. dot-addressable graphics capabilities.

The company claims that the printer head has a life of 500 million characters, that the noise level is 54 dba and that it is designed for heavy-duty applications.

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## SYSTEMS &amp; PERIPHERALS

## Cartridge facts and fancies

From page 21

offer cartridges, compare their warranties. What do the specifications guarantee? Does the price include shipping? If you agree to buy X number of cartridges on an annual basis, will they drop-ship an amount monthly or do you have to receive the entire order?

Do comparison buying. Purchase a measurable amount from each vendor. Track performance via your automated library system, and maintain logs on different brands when purchased.

Anticipate sufficient lead time when ordering cartridges. Don't wait until 4:15 p.m. on Friday to find out you are down to the last box.

When cartridge shipments arrive, check that the correct volume is received and that there are no damaged boxes. Do not store the cardboard boxes in the tape area. This can add paper dust contamination to the environment. Do not store the boxes where the temperature exceeds 120°F or the humidity exceeds 80%. Some warranties recommend 90°F as the maximum temperature for both the storage and operating environments.

### Allow acclimation

Always allow the cartridges to acclimate to the computer area. Recommended operating conditions are at 70°F and 45% to 50% humidity.

External volume serial numbers should be easily read and should not smear or peel. Invest in color coding to prevent misfiles. Each number should be individually removed and applied with a minimum amount of finger contact to its adhesive surface. Remember that labels have a shelf life. Order a reasonable amount that can be used in a year's time.

If your company's name and address aren't on the cartridge, how will your cartridges be returned? Consider combining the reel number and company name and address on one label. External labels should be discouraged. Labels do not protect a tape, and auditors agree they advertise the internal data contents. If you do require labels, remove old labels and apply new ones. Write information on the label before attaching it to a cartridge.

Before loading the cartridge, inspect it to ensure that the leader block is correctly latched and that the container is not chipped or cracked. If a cartridge is dropped, inspect before loading.

Do not release the leader block and pull tape from the cartridge. Do not expose cartridges to moisture, direct sunlight or strong magnetic fields, such as ones that exist near DC motors or AC generators. If dirt appears on the outside of a cartridge, use lint-free cloths and IBM cleaning fluid. Do not allow anything wet, including cleaning fluid, to come in contact with the tape.

When shipping cartridges, place them in sealed, moisture-proof bags for protection from contaminants and physical damage. The shipping container should contain enough packing material to cushion and protect the cartridge from movement. Use only noncontaminating packaging materials, such as bubble packs.

## Hospital saves with ASCII printer links

### Says adapter connects machines to 3270s

By Stanley Gibson

BUFFALO, N.Y. — Using a printer adapter announced earlier this year and delivered recently, Buffalo General Hospital in Buffalo, N.Y., has been able to save money by using ASCII printers instead of IBM 3287 printers.

The Adacom Corp. CP-150 is an IBM 3287 ASCII printer adapter. It allows ASCII serial or parallel printers to attach via an RS-232 connection directly to IBM 3274 and 3276 controllers.

The CP-150 also has the ability to emulate all IBM 3287 printer functions, according to the manufacturer.

### Plans to add others

Gene Flore, manager of technical services for the MIS department of Buffalo General Hospital, claims that he has 70 CP-150s installed at this time and plans to add another 30 by November.

"It allows us to substitute an ASCII printer on an IBM Systems Network Architecture network. It looks like a 3277," Flore says.

The MIS manager says he is buying ASCII printers to use with the adapters from several sources and reports that he is paying about 55% to

60% less than IBM prices.

### Used in quiet wards

In certain wards of the hospital where quiet is necessary, Flore says, he uses the CP-150 to substitute a relatively silent ASCII ink-jet printer for a 3287 printer.

Flore also praises the CP-150 because, he says, it allows an IBM Personal Computer to be integrated into his network. He says this integration would not be possible with 3287 printers.

The product has been available since January through distributors and OEMs. The CP-150 printer's suggested price is \$1,190, according to Adacom.

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# COMMUNICATIONS



**DATA STREAM**  
Merv Adrian

## VTAM links micros, hosts

The next wave in micro-to-mainframe communications could well be the native VTAM link. There have been a number of significant developments in micro-to-mainframe communications during 1986, among them IBM's Enhanced Connectivity Facilities announcements in June; Digital Communications Associates, Inc.'s introduction of Irmalan products using the industry-standard terminal emulator interface on local-area networks; Lotus Development Corp.'s entry into the market with The Application Connection; and Micro-Tempus, Inc.'s Tempus-Access debut.

Now, two VTAM-based micro-to-mainframe products — one on the market, one still in beta test — promise to help MIS managers solve two major IBM mainframe-related headaches: the need to connect microcomputer users to multiple-system architectures and response-time degradation that results from too many users demanding too much from the host.

The significance of native VTAM communications is not obvious to most micro-to-mainframe users, however. To understand it, you must first look at the existing architectures.

Most currently available, on-line micro-to-mainframe products do not communicate directly with VTAM. Instead they link with teleprocessing monitors such as IBM's CICS or the widely used

See VTAM page 32

Adrian is chairman of the micro-to-mainframe Special Interest Group of the New York PC Users Group and senior programmer/analyst at Shearson Lehman Brothers.

## Outlook tepid for Autofact

### GM readying for '87 MAP demonstration

By Rosemary Hamilton

General Motors Corp. recently announced that its next major demonstration of the networking capabilities of Manufacturing Automation Protocol (MAP) is slated not for Autofact 1986 but for the 1987 show.

As a result, this year's Autofact trade show and conference, to be held Nov. 11-14, should lack the MAP-generated excitement of last year's show, observers noted. GM, in fact, plans to offer only a "passive booth presentation," according to Tony Durham, a MAP liaison at GM. "This year, we don't have anything to say in a development sense," Durham said.

A major reason for GM delaying its next major MAP demonstration is that it wants to use MAP's latest version, 3.0, which is still being finalized by industry standards groups such as the MAP/TOP Users Group.

The auto maker is encouraging vendors to participate in the process to establish specifications for the 3.0 version. It is also soliciting support from vendors to participate in the Autofact '87 demonstration, to be called the MAP/TOP Enterprise Networking Event. TOP, or Technical Office Protocol, is an evolving set of networking standards designed to be MAP's counterpart in the office.

If GM is able to round up 50 vendors, each will be charged \$36,000 to participate, Durham said. The price will increase if a lower number of vendors commit and decrease if more than 50 participate.

At the MAP/TOP Users Group meeting last month, Michael Kaminski, MAP project manager at GM, caused some confusion among attendees when he suggested that MAP vendors not participating in the finalization of the 3.0 specifications or the Autofact '87 event will run the risk of developing products that do not conform to the proper specifications.

"We won't look too kindly if someone

See OUTLOOK page 33

## AT&T unveils T3 multiplexer

By Stanley Gibson

NEW YORK — Addressing customers with enough telecommunications traffic to justify multiple T1 links between sites, AT&T recently introduced the DDM-1000 dual DS-3 digital multiplexer, which can combine up to 28 T1 channels in a single 45M bit/sec. T3 transmission facility. Users have traditionally had to install multiple T1 multiplexers to get the same network capacity, according to AT&T.

"For our largest customers, sheer economics dictates that they find ways to bundle the biggest number of lines possible onto a single pipe," said Jeff Akers, product manager for network distribution systems. The multiplexer is particularly well suited to campus-type applications, where it can multiplex onto a microwave relay,

See AT&T page 31

## AST introduces Starlan-based LAN Ethernet alternative

By Rosemary Hamilton

IRVINE, Calif. — A local-area network (LAN) based on the Starlan network concept was recently introduced by AST Research, Inc. Starlan, a star-shaped network that transmits at 1M bit/sec. over ordinary twisted-pair telephone wiring, was designed to be a low-cost alternative to Ethernet products that transmit at 10M bit/sec. but require special installation of coaxial cable.

The AST Star System, scheduled for shipment this week, is based on the IEEE 802.3 1Base5 specification that is close to final approval by the Institute of Electrical and Electronics Engineers. AT&T is promoting its own version of the product

See AST page 33

### INSIDE

Western Union offers a packet-switching service/31

### NEW THIS WEEK

■ Case Communications offers a family of variable-speed modems

■ For more on this and other new products, see pp. 115-139.

### INSTANT ANALYSIS

"Users won't let MIS tell them how to communicate. They'll go out and buy one of every kind of micro-to-mainframe link, and then it's up to us to get it all to work."

— Merv Adrian, chairman, micro-to-mainframe Special Interest Group of the New York PC Users Group

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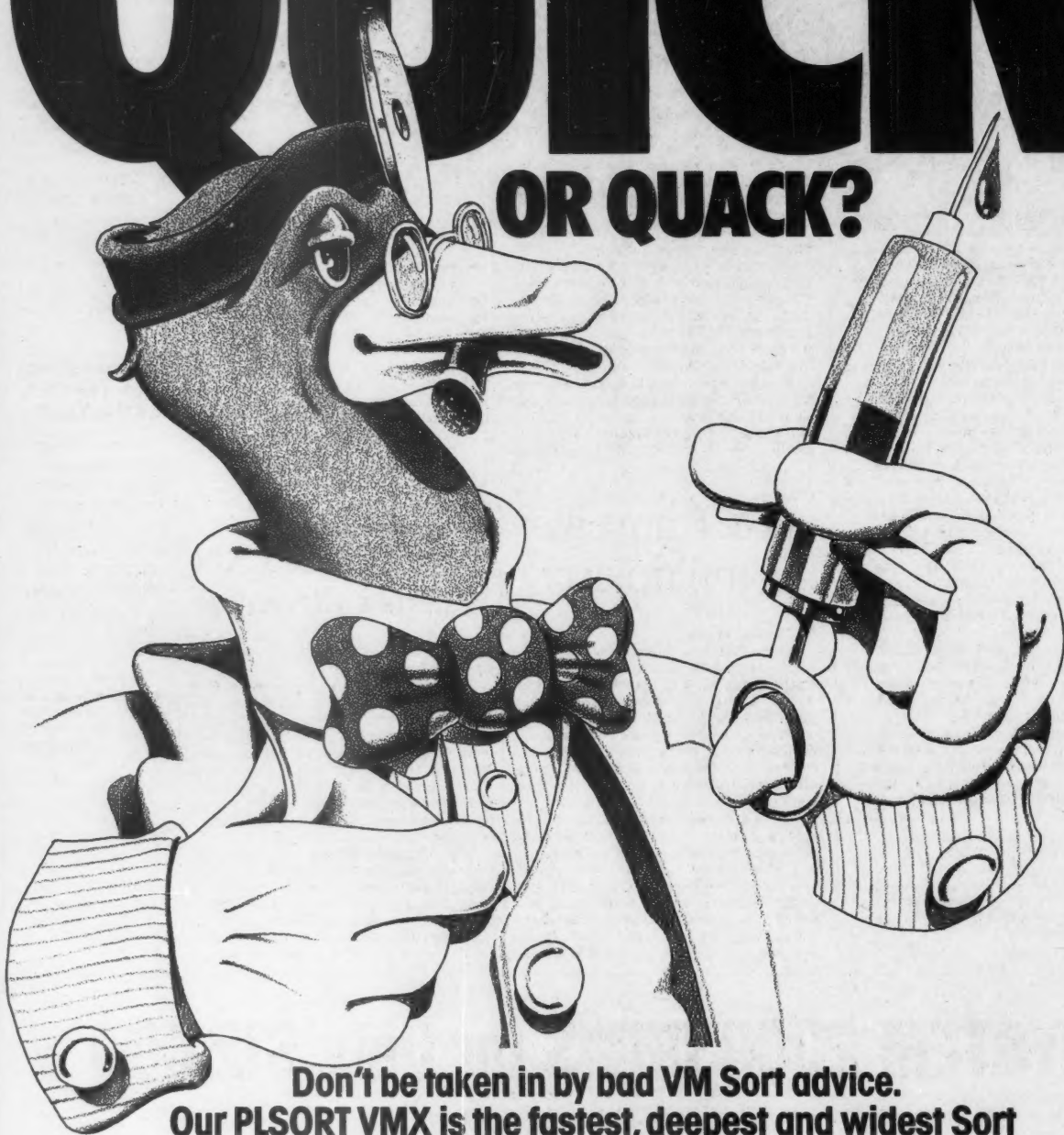


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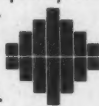
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## COMMUNICATIONS

## Western Union develops X.25 packet switching

By Stanley Gibson

UPPER SADDLE RIVER, N.J. — Drawing on its Easylink backbone network, Western Union Corp. recently began offering a CCITT X.25 packet switching service to businesses for data communications. Western Union Packet Switching Services is priced at 10% to 15% less than competing services, according to the vendor.

The low pricing was feasible because Western Union is basing the service on already-existing packet switching facilities originally developed for its Easylink electronic mail offering, explained Frank Cleary, Western Union vice-president of corporate network services.

The Gamewell Corp., a Medway, Mass., maker of fire alarm boxes and smoke detectors, began using the service approximately a year before it became a commercial product. The service has provided greater than 15% savings over competitive offerings from value-added network vendors Telenet Communications Corp. — a division of U.S. Sprint Communications Co. — and McDonnell Douglas Network Systems Co./Tymnet, according to data processing manager Ross Spinelli.

"Packet switching makes sense for Western Union because they already have the facilities, but I doubt whether they can break into the market successfully at this late date," said Joseph Healy, group manager of voice and local communications systems for Fairfax, Va., consulting firm Network Strategies, Inc. "They'll have to offer big cost savings to win over competitors' customers who are already getting decent service, especially since it's a lot of trouble to switch vendors." Western Union's financial troubles may discourage potential customers, Healy added.

### Supports 60 nodes

Western Union's network currently supports 60 nodes with packet assembler/disassemblers. Sixty more nodes will be added to the network by the end of the year, the company said. Users can transmit over dial-up lines to the nearest Western Union service node or install on-premise packet assembler/disassemblers and have a packet-switched, leased-line connection to the nearest node.

Western Union also allows users to access the system through Western Union long distance at no extra charge. "Every voice switch is co-located at a packet node," Cleary said. The basic long-distance connect charge is \$3.95 per hour.

Companies in regions that are not served by Western Union's long-distance network can use an 800 number for dial-up access to the service at no extra charge.

Western Union's service supports asynchronous transmission speeds ranging from 300 to 2,400 bit/sec. and IBM 3270 synchronous transmissions at rates ranging from 2,400 to 9.6K bit/sec. The network also supports IBM 2780/3780 protocols and X.25 error correction protocols designed for IBM Personal Computer transmissions over dial-up lines.

## AT&T unveils T3 multiplexer

From page 29

according to Akers.

Equipped with one or two DS-3 multiplexers, the DDM-1000 accepts up to 28 DS-1 signals supporting a combined maximum of 672 56K bit/sec. voice channels. The signals can then be transmitted over a 45M bit/sec. T3 link or converted into the bit stream of a 90M bit/sec. fiber-optic connection that supports the combined output of two DS-3 multiplexers. A third option is for the DDM-1000 to multiplex signals over AT&T's DR-18 microwave radio and AT&T's Accunet T45 45M bit/sec. digital service.

The market for multiplexers supporting T3 45M bit/sec. bandwidth is limited primarily to major banks, insurance companies, oil firms and financial institutions, according to Joaquin Gonzalez, a telecommunications analyst with the Gartner Group in Stamford, Conn.

"People don't go to T3 unless they have integrated voice and data on a lot of it," Gonzalez said. A T3 multiplexer becomes cost-effective when at least seven T1 lines are in use at a site, he added.

The DDM-1000 multiplexer is designed to interface with a range of AT&T customer premise equipment, including the System 85 and 75 private branch exchanges, 3B systems and Dataphone II 700 multiplexers.

In addition, the DDM-1000 is compatible with AT&T's Digital Access Cross-Connect Switch (DACS), which

switches 56K bit/sec. channels among multiple T1 links at the vendor's central offices. By interfacing with DACS, the DDM-1000 can transmit over AT&T services such as Accunet T1.5 and Accunet T45. Users can also determine the destination of individual 56K bit/sec. channels leaving AT&T central offices by accessing, via terminal, the vendor's Customer-Controlled Reconfiguration service.

Although complete hardware redundancy is available, one backup line card for every seven T1 line cards is adequate for most purposes, Akers said.

DDM-1000 pricing depends on the configuration and level of redundancy required, AT&T said. Electrical applications cost between \$11,000 and \$25,000; optical applications cost between \$18,000 and \$40,000.

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## COMMUNICATIONS

## VTAM links micros, hosts

From page 29

MVS/TSO and VM/CMS environments, which in turn interface with VTAM. This configuration has at least two potential drawbacks — response-time problems and the fact that each micro-to-mainframe product works with only one type of mainframe environment.

Transaction speeds become more of a problem as the user population grows and the size and number of micro and mainframe applications increase. Many organizations begin with downloads of a few hundred records that take a few minutes of personal computer time, then start to experience system availability problems as users demand greater amounts of information from the mainframe.

Micro-to-mainframe links that go through an intermediary layer like CICS add another step to the communications process and to the work load of an already overburdened mainframe. Another potential source of response time degradation is the fact that CICS and the others do not always perform optimally under heavy traffic loads.

### Vulnerable to overhead

Both TSO and VM/CMS are vulnerable to overhead that results from supporting highly variable resource utilization rates, device types and applications, according to Michael Camp, president of Raleigh, N.C.-based Tangram Systems Corp. CICS handles high transaction rates but is less effective at load balancing because it handles all types of transactions in the same way. As a result, a large market has arisen to fill the demand for tuning products designed to help manage the CICS environment.

In contrast, VTAM-based micro-to-mainframe links, by circumventing the potential degradation problems of the intermediate communications layer, can speed up a system's effective data transfer rate. Tangram recently tested its own VTAM-based micro-to-mainframe link, Arbiter, against another vendor's TSO-based prod-

uct. The effective rate of the rival product's data transfer fell somewhere around 320 char./sec., according to Camp. With Arbiter running under VTAM, the rate rose to around 800 char./sec.

Other factors that influence speed are TSO response to the inquiry against it, speed of the board performing the emulation and the degree of optimization within the program. Arbiter can cache the data faster than a PC Basic program, for exam-

ple. Thus the application will be running behind the data transfer instead of having to wait for it.

Arbiter also scored well against a CICS-based micro-to-mainframe product. Revlon, Inc. systems technician Laszlo Szijj reports that some early tests of a beta version of Arbiter showed a 50% increase in speed over the original CICS-based system. Unlike CICS, which requires conversion of a data stream into CICS-type transaction-

oriented processing, VTAM can treat transfer of an entire file as a transaction without translation.

All systems have limits, and changing the number of layers between a task and the CPU, as Arbiter does, is not a cure-all for response time problems. When the number of concurrent user sessions under Arbiter reaches a certain level, the system will slow down just as it would with any other application.

Linkware Corp.'s VTAM product, which is scheduled to ship in fourth-quarter 1986, addresses another aspect of micro-to-mainframe communications — user access to multiple mainframe environments. "We had been getting requests to provide Linkware under CICS and other environments," reported John Burns, Linkware director of product planning and management.

"Linkware provides connectivity between any micro

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## COMMUNICATIONS

or mainframe CPU running Linkware, and many companies have several network technologies in use at the same site," Burns said. VTAM can act as the common link between PCs and different mainframe environments, he noted. "The host assumes that it's talking to a 3270. We're able to tell it from the initiating side what the data looks like so integrity can be maintained, and neither end needs to know what's at the other end for it

all to work."

It seems likely that, through the use of layered architecture, Linkware could eventually provide a bridge between the two major architecture models — IBM's Systems Network Architecture and the Open Systems Interconnect communications standard.

This would be a significant development; no speculation on the subject was forthcoming from the company, however.

## AST unveils local net

From page 29

as a network for its micros.

In addition to AST, a handful of other vendors, including Western Digital Corp. and Retix, have announced Starlan-based networks since AT&T introduced its offering earlier this year. According to David

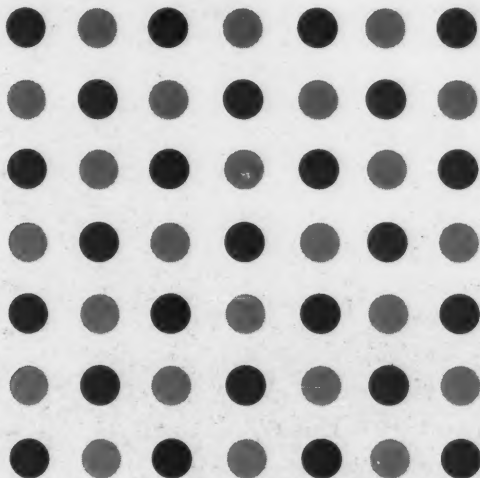
Terrie, president of Boston-based Newport Consulting and editor of Patricia Syebold's "Network Monitor" newsletter, the Starlan-based networks "will be one of the major LANs and will sweep away all but a couple of those competing in the low-cost area."

"The prices of Starlan networks are about half of what they are for standard Ethernets now," Terrie said.

AST is offering a \$795 starter kit, which includes

two adapter cards, cabling and software. The software includes the AST-Network Program, which provides an electronic mail capability, a user-definable menu interface, a resource sharing facility and the AST-Netbios Option, which links the Star System and an IBM Personal Computer LAN. Additional adapter cards cost \$345 each. A \$75 copy of the AST-Network Program is required for each additional user.

Users also have the option of purchasing the AST hub configurations, which would connect micros to a host system in a star-topology configuration. The Starhub/8 sells for \$795, and the Starhub/16 sells for \$1,195.



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## Outlook tepid for Autofact

From page 29

comes out and says, 'Here's a product that meets the specs,' because it maybe won't," Kaminski said.

Asked by an attendee if he was implying that nonparticipating vendors would be shut out from 3.0 specs, Kaminski said, "If a supplier doesn't participate, there's a chance that his product won't comply. But the documents will be available. The people who go through the process will have products that meet the specifications."

Kaminski said he expects the preliminary 3.0 specifications to be drawn up by year's end, at which time the specifications will be supplied to participating vendors for review. By April 1987, a 3.0 draft specification is expected to be released for comments. The final version will be drawn up in the fall of 1987 to be released at the beginning of 1988.

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**T**raditional IBM IMS and CICS application development brings with it the freedom to design transaction processing applications to the user's needs.

Traditional development involves the knowledge and creativity of the systems designer and the full power and functionality of the transaction processing environment. The tools of traditional development include Message Format Service (MFS) and Basic Mapping Support (BMS) for screen formats, the Cobol and Assembler languages for program logic, native data communications interfaces to the transaction processing environment, a data base management system for storage and retrieval of information and a variety of testing tools to verify the results.

Seldom would traditional development techniques be blamed for the design of an application. That responsibility lies squarely on the shoulders of the systems designer. If traditional development can be blamed for anything, it is for blowing the development and maintenance budgets, which is why the productivity tools of today came into existence.

With programmer productivity a hot issue in the development center, productivity tools have become very popular at the expense of the design issue. The freedom to design an application to fit the user's needs and the full potential of the systems software has

See **WHAT** page 42

*Pflenzinger is president of IMS Consulting, Inc., an Encino, Calif.-based consulting firm that specializes in IBM's IMS DB/DC and CICS/DL/1.*

## Token-Ring gets DBMS

Start-up claims relational manager makes AT a server

By Charles Babcock

MENLO PARK, Calif. — A relational data base management system for the IBM Token-Ring network has been introduced by a California start-up company.

Gupta Technologies, Inc. of Menlo Park is the producer of SQLbase and licenses it to two major mainframe software companies, Computer Corp. of America in Cambridge, Mass., and Computer Associates International, Inc. of Garden City, N.Y., according to Umang Gupta, president of Gupta Technologies. He is the former general manager of the microcomputer product group at Oracle Corp. His company, which had \$500,000 in revenue last year and is projected to have \$1 million this year, does not yet have its own sales force. The firm will hire a marketing and sales

staff in early 1987, Gupta said.

SQLbase reportedly transforms an IBM Personal Computer AT into a high-performance, relational data base server. Personal computers on the network can transmit SQL commands to SQLbase on the PC AT and share the services of the data base management system, Gupta claimed.

The software's function is somewhat analogous to a Britton Lee, Inc. or Tera-data Corp. data base machine that can accept queries from multiple users on Digital Equipment Corp. VAXs, manage the data access functions and return the data, Gupta noted.

The system, priced at \$1,995 for a multi-user version and \$995 for a single-user version, also operates on any network that is IBM Netbios-compatible, including IBM's PC Net and Novell, Inc.'s and 3Com Corp.'s local-area networks, Gupta said.

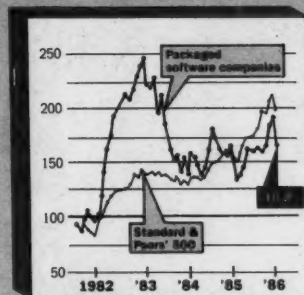
SQLbase includes a relational data base engine, network router programs and the

See **TOKEN-RING** page 43

### DATA VIEW

#### Application software companies

Stock performance of independent vendors



Information provided by E. F. Hutton Computer Software and Services Monthly.

## CICS tool maps MVS changes

By Charles Babcock

WALTHAM, Mass. — BGS Systems, Inc. has added a feature to its MVS operating system capacity management product that pinpoints how CICS subsystems affect MVS performance.

BGS Systems is the 11-year-old Waltham producer of Best/1-MVS, a capacity management product in use on 800 IBM mainframes. The new addition, called CICS Feature, works with Best/1-MVS using proprietary algorithms to model and predict the effect of growth on mainframe performance. It can also be used to project the impact on network performance, claimed Don Russell, BGS Systems vice-president.

CICS Feature is available immediately at a price of \$9,000 with an annual maintenance charge of \$1,800, the firm said.

The 140-employee firm specializes in MVS system capacity planning software.

### INSIDE

Data Retrieval re-vamps its text management system/38

Sterling Software combines DB2 and other DBMS files/38

Study shows AI gaining acceptance in corporate America/38

### NEW THIS WEEK

■ Artificial Intelligence Corp. announces English-language access to DB2

■ For more on this and other new products, see pp. 115-139.

### INSTANT ANALYSIS

"From all the indications I have, it's happening. A new channel has opened up in MIS departments to do business computing with VAXs."

— Regis Kaufman, general manager for Digital Equipment Corp. business, Software International Corp.

## ELECTRONIC MAIL COMMUNICATION CENTER

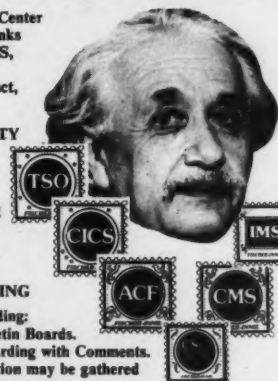
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  - Dozens of other electronic mail features.



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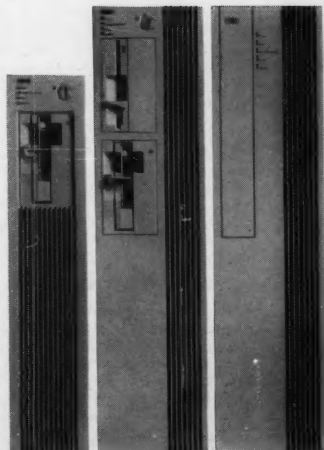
What could a chain of more than 3,000 pizza stores and a hospital management company possibly have in common?

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The NCR Tower is actually a family of computers, ranging from a 2-4 user system to a departmental system. Or from a small business network to an international network of hundreds of users. Memory capacity ranges from one to sixteen MB. And for disk storage, from 25 MB to over 5.5 gigabytes. Networking and communications are easy because the Tower supports all major protocols, including SNA, X.25.

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## SOFTWARE &amp; SERVICES

## Study reports AI joining corporate mainstream

### Expert systems' business use grows

By Eddy Goldberg

ARLINGTON, Mass. — Expert systems have successfully moved from the research and development arena into a wide cross-section of the commercial world, according to a recently released study of 125 expert system development efforts in corporations across the U.S.

The study, "Expert Systems in the Workplace," is based on interviews in more than 100 firms and includes verbatim extracts from developers and users of expert systems, according to Peter M. O'Farrell, who authored the study.

"Corporations will want to use their existing staff and hardware, access their data bases and maintain expert systems in some reasonably traditional fashion that doesn't mean disrupting the entire organization," O'Farrell said.

"There are about 400,000 Cobol programmers and 100,000 Fortran programmers out there and only 2,000 to 3,000 LISP programmers," he pointed out.

The \$950 study, published by Cutter Information Corp., an Arlington-based publisher

of newsletters and reports, identifies four key elements for the successful development and implementation of expert systems.

Organizational issues top the list of considerations in expert systems development. These include control of professional and sectional competition within the company; dealing with the diverse groups that contribute to system development or are affected by it; and setting re-

”

**Organizational issues top the list of considerations in expert systems development.**

alist goals consistent with the objectives and strategies of the firm.

A second factor critical to success is finding a champion for the expert system within the organization. Such a champion was found in every firm that succeeded.

Careful problem selection is a third key factor.

Placing strong emphasis on the human expert whose knowledge is being extracted and encoded is also a key to success in developing and implementing an expert system.

Companies sometimes tried to solve problems that baffled human experts or to replace the expert after the system was completed, according to O'Farrell.

Retaining the human expert is critical in supporting the expert system and in solving problems the system is unable to deal with.

## Sterling releases DB2-DBMS link

### DBMS files can now be combined via Dylakor link

By Charles Babcock

GRANADA HILLS, Calif.

— The Dylakor Division of Sterling Software, Inc. has announced a product that allows data from IBM's DB2 to be combined with data from other popular mainframe data base files.

Dubbed Dyl-DB2 Release 1.5, it can perform joins on two or more DB2 data base files and also allows DB2 data to be mixed with data from other standard IBM file systems, such as IMS, QSAM, VSAM, ISAM and BDAM.

It can also be mixed with files from Cincom Systems, Inc.'s Total, Software AG of North America, Inc.'s Adabas and Applied Data Research, Inc.'s Datacom/DB, Dylakor President Carole Morton said.

Dyl-DB2 also works in conjunction with the Dylakor fourth-generation information management and report writing systems, Dyl-280 and Dyl-280 II. Within these systems, Release 1.5 provides users with embedded SQL syntax for accessing DB2 data.

#### Works in MVS/TSO

Morton said the product was designed to work in IBM's MVS/TSO operating system environment; it will be available in November at a price of \$6,380 for the 1,800 users of the Dylakor report writing systems, Morton added.

Release 1.5 employs six SQL commands. They are Declare Cursor, Select, Open, Fetch, Close and Whenever.

Morton said the product is a retrieval-only tool in the first release. The second release in the first quarter of 1987 will incorporate updating capabilities, including insert, update, delete and non-cursor-based select functions. A later release will include support for CICS, she claimed.

"We don't know how many of our customers use DB2. Four hundred are IMS users, and we make the assumption that most of them have DB2," she said.

The Dylakor information management and report writing languages are able to make use of Cobol, Fortran and assembler routines as well as Release 1.5 SQL statements, providing a range of options for compiling reports with information from DB2, she said.

#### Manager enhanced

In a separate statement, Dylakor announced that it has enhanced Dyl-270, a free-form, data management and extraction utility that is a subset of the Dyl-280 information management system.

Release 2.20 has the capability to function with the Dylakor micro-to-mainframe link, Dyl-Link. Release 2.20 also includes a new function that allows it to write to and read from mainframe-based, microcomputer-originated virtual disk files. Release 2.20 can, in effect, maintain mainframe files that were created by microcomputers linked to the host, Dylakor

spokesman Chris Richter said.

Other enhancements include full VSAM support with the addition of file access to VSAM's Relative Record Files, as well as IBM's OS operating system access to BDAM files and IBM's DOS operating system access to DAM files.

Release 2.20 also includes a copy function to allow users to retrieve Dyl-280 code from source code libraries, such as Applied Data Research's Librarian, Pansophic Systems, Inc.'s Panvalet and Condor Technology's Control 1.

Release 2.20 is available at a price of \$7,900 for both OS and DOS versions.

Dylakor also announced Release 5.2 of Dyl-280, which provides additional IBM BDAM support for MVS users and IBM DAM support for IBM Virtual Storage Extended users.

Release 5.2 will be available Oct. 15 at a price of \$11,000.

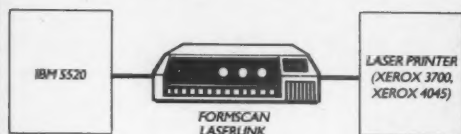
#### Features added

Dylakor also announced Release 2.2 of Dyl-280 II, which includes several additional features such as expanded arithmetic facility and use of the letter-writer function to print two documents simultaneously.

The release will be available Oct. 15 at a price of \$15,000, Dylakor said.

The Dylakor Division is a developer of utility information management and fourth-generation application software products for IBM mainframes and microcomputers.

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## Data Retrieval broadens target mart

### Aims DBMS at IBM monitor users

By Jean S. Bozman

MILWAUKEE — The Data Retrieval Corp. has released an updated version of its TextDBMS data base management system, used in handling large volumes of text. Data Retrieval also announced several companion products.

A \$50,000 system in use by 20 customers, including the states of Kansas, Georgia and Illinois, TextDBMS is being targeted for IBM mainframe users who use IBM's CICS teleprocessing monitor, company officials told 120 customers at the recent Data Retrieval users group conference in Milwaukee.

The product is available with three optional companion products — the \$40,000

Textcomposer for printing and pagination; the \$45,000 Textsearcher for word search and retrieval; and the \$45,000 Textbuilder, which allows end users to design applications for TextDBMS, according to Marketing Director Joseph Mirecki.

In Illinois, TextDBMS has been used for preparing and editing legislative documents since 1971. It allows legislative aides to search documents for errors and to correct errors.

"We've found that it allows us to prepare proposed legislation for printing," said George Russell, manager of the Legislative Information System in Springfield, Ill., and president of the Data Retrieval users group.

Unlike regular DBMS, which can only handle truncated versions of large texts, text management systems are able to handle full-length

documents. System overhead is high, however.

With TextDBMS, 2M bytes of memory are required to store data bases that can range up to 45,000 documents with a total of four million words, Data Retrieval sources said.

A year after West Publishing Co. acquired it, Data Retrieval is bent on broadening its base.

It is launching a campaign to market its software to large IBM shops in manufacturing or service companies.

President Bert Sheingate said that the company's software is best suited for organizations that generate extremely long documents that must be updated from time to time.

Bozman is a Computerworld contributor based in Chicago.



## SOFTWARE &amp; SERVICES

# Package simplifies VAX management, program development

By Charles Babcock

LEXINGTON, Mass. — A software package that reportedly allows people with no more computer experience than the use of an IBM Personal Computer to manage a Digital Equipment Corp. VAX has been announced by the American Management Co.

Called V-X Master, the product will be offered in three versions in December at prices that range from \$3,000 on the Microvax to \$12,000 on the VAX 8800, according to company spokesmen.

John R. Van Slyke, American Management president, claimed that the software package will make it "easier for software developers to create and deliver new packages for DEC's

Microvax computers."

## Designed for QA environments

V-X Master I is designed for use in office or engineering environments where a system is not managed by a full-time data processing employee, American Management spokesmen said. It provides a menu-driven user interface to the VMS operating system, which aids an unsophisticated user in managing the VAX, the spokesmen added.

It reduces system errors by assisting the novice manager with queries, error-checked screens and on-line Help facilities. It provides easy-to-use function for all major system management areas, including system

installation and setup, performance monitoring, user and port management, disk and file management and security management.

V-X Master II is a more sophisticated tool for data processing professionals managing VAX/VMS systems. It allows a manager to implement Structured System Management, a standardized approach to managing multiple VAX systems in a data center environment and remote sites, spokesmen said.

## Network support

It provides a set of features that include system installation and set up, system monitoring, user management, port/interconnect manage-

ment, disk and file management and security management. Network and cluster support will be available on Version 2, which is slated for delivery in spring 1987.

V-X Master VAR allows software developers to customize V-X Master I and II as part of their own software products. It allows software developers to provide a complete system management solution with their products.

American Management Co. is offering the three implementations on a prerelease basis as of Nov. 1.

The Lexington company was founded in 1968 and develops system management software for the VAX product line.

# Henco unveils DBMS wares

By Eddy Goldberg

WALTHAM, Mass. — Henco Software, Inc. is expected this week to announce Info-DB+, a new release of its data base management system and fourth-generation language for use on Digital Equipment Corp. VAX systems.

Info-DB+ is a new generation of Henco's 11-year-old Info product, according to Richard A. Spinello, manager of product marketing for Henco. Its performance has been enhanced through a sophisticated data flow model that reduces I/O time by optimizing queries.

It also has an enhanced ability to process multiple commands in one data pass. The previous release of Info required many passes through the data to produce multiple reports, Spinello said.

Info-DB+ is designed to work with host file structures in DEC's Record Management System data base, allowing data to be installed into Info-DB+ without conversion, Spinello said. In a Vaxcluster, users can take advantage of distributed data base features, he added.

## Data dictionary

Info-DB+ has a full-scale active data dictionary that manages all data base files and provides validation criteria, edit checks and I/O pictures for each item in the data base, as well as providing data base security. It also offers a menu-driven interface and screen-oriented tools in addition to the command-driven interface retained from the previous Info release, according to company spokesmen.

Other features include a report writer, a forms generator, full-screen editing capability, a fourth-generation language for both production application development and prototyping and transaction processing capabilities with an automatic roll-back/recovery feature, spokesmen said.

Info-DB+ will be available in January, spokesmen said. The price will range from \$15,000 for the Microvax to \$60,000 for the VAX 8800. Info's approximately 3,500 current users will receive Info-DB+ free as a maintenance release.

Demand for corporate information services is expected to grow dramatically over the next decade. With many data centers already running 24 hours a day, managing this constantly increasing workload may become a bigger problem than doing the work itself.

But a large part of that challenge can now be met by simply moving up to real-time job scheduling, with ADC2, Automated Data Center software. Designed for an MVS or MVS/XTA operating system, ADC2 software automatically builds and submits schedules. Jobs are automatically released as predecessor conditions are met. With ADC2 software, all jobs are monitored as they run, providing real-time job and system performance statistics. This current and historical job status information is immediately available to the operator, scheduler or data center manager for decision making.

For greater convenience, scheduling control can be decentralized. This allows different user departments and even remote sites to run multiple schedules on the same system concurrently. Scheduling with ADC2 software is so easy to understand that remote users need very little supervision from the central site.

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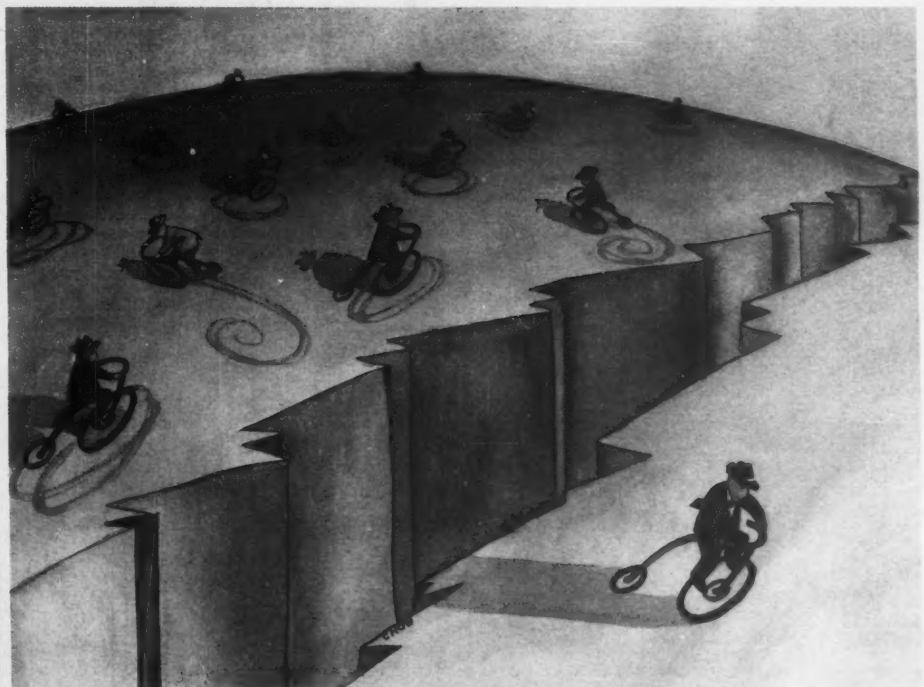
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## SOFTWARE &amp; SERVICES

# Signal Technology adds SQL tool to DBMS

By Charles Babcock

GOLETA, Calif. — Signal Technology, Inc. has added an SQL interface to its relational data base management system and fourth-generation language, Smartstar, enabling it to access Digital Equipment Corp. VMS file structures.

Version 5.0 of Smartstar operates in the VAX VMS environment. Signal claims it is the first company to supply an SQL interface to support DEC's Record Management System files and Relational Data Base files. The interface includes an interactive report writer.

With the SQL interface, VAX users may also access other SQL-based DBMS, such as Oracle Corp.'s Oracle

or Relational Technology, Inc.'s Ingres, Signal President John Markel said.

## Omnibase also gets interface

A second Signal product, Omnibase, has also been given an SQL interface. Omnibase is a data base management system and fourth-generation language for the Britton Lee, Inc. Intelligent Data Base Machine or Relational Server RS series.

The machines off-load relational data base operations from a host computer, freeing up the CPU and boosting data base management performance.

A new Smartstation component has been added to both Smartstar

and Omnibase, Markel said, that allows application developers to create software workstations for end users.

## Menu-driven

The workstation can be designed to be menu-driven and combine any number of user applications or VAX VMS facilities into integrated, windowed environments, he said.

Smartstar and Omnibase are available immediately in two components, called 4GL/User and SQL/Developer. 4GL/User starts at a price of \$7,500 for a DEC Microvax.

SQL/Developer is priced at up to \$50,000 for the VAX 8300 or higher. Omnibase prices range from \$10,000 to \$55,000.

# What price productivity?

From page 35

been sacrificed with the arrival of these numerous productivity tools.

The problem is that most of these tools have closed architectures. This means that architectural assumptions have been made that restrict important technical decisions when designing a user's new application.

These restrictions reduce functionality by assuming a one-size-fits-all approach that includes limited screen capabilities, fixed transaction flows such as a predetermined sequence of events, limited program architectural options, cumbersome procedural logic and the infamous user exists and code buckets.

The early non-Cobol productivity tools had all of these restrictions and were often referred to as black box generators, with the programmer simply providing the parameters or variables to the predesigned and pre-coded common functions of the application generator.

This category of tool, along with its performance problems, had a mind of its own and would dictate virtually every aspect of the final design. IBM's Application Development Facility is an example of this category of tool.

The Cobol-based productivity tools available today are a major step in the right direction but have their own design restrictions. A Cobol-based tool generates the same native source code as traditional developments, such as MFS, BMS, Cobol and data base-data communications code. These tools, while addressing the performance issue, too often have the same design and integration problems of non-Cobol tools.

## Justifying restrictions

At first, these restrictions were justified in the name of productivity and by the fact that simple applications could be easily built. The applications backlog is usually full of these simple applications, which are large in number but far less significant when compared with the large production applications that consume the largest portion of the development budget.

It has not taken long for design and integration problems to arise, especially on these larger, more sophisticated applications. It is becoming common to hear systems designers discussing the fact that they have to design their new application to operate within the closed architecture of a productivity tool.

This is becoming a major problem, because new tools, lacking the full power and functionality of an open architecture, are unable to address all of the systems in the application backlog. Being unable to use the same tool or family of tools on all the systems waiting to be built is inconsistent with the strategic goals of most data processing organizations.

What is the solution? To acquire a family of tools from a single vendor that supports the full design freedom, functionality, integration and performance of traditional development and that also provides increased development productivity. Having an open architecture would be a major selection criterion when evaluating these tools.

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## SOFTWARE &amp; SERVICES

# Software International's Masterpiece targets VAX mart

By Charles Babcock

ANDOVER, Mass. — Software International Corp., a subsidiary of General Electric Co., is attempting to position itself to exploit the rapidly growing market for Digital Equipment Corp. VAX software.

Regis F. Kaufman, Software International's general manager for DEC business, says DEC "has taken a lead role in convincing large companies of the importance of decentralized processing. So we are seeing our sales double this year."

Software International announced earlier this year that it had moved its Masterpiece series of accounting software to the VAX after originally designing it for IBM mainframes and the IBM System/38.

Software International assumed full ownership of the applications and will provide support for them, Software International President Jeffrey S. Goodman said.

## Buys documentation, rights

In addition, Software International gained product documentation, exclusive marketing rights and all existing customer contracts as well as staff. About 100 customers have become purchasers of the VAX Masterpiece series since it was announced in May, company officials said.

In another move, Software International established a separate DEC business organization for developing, marketing and supporting VAX prod-

ucts. Kaufman is the head of that group.

Kaufman said VAX sales were growing at a rate of 35% a year and predicted that Software International will be able to double its sales of the Masterpiece series on the VAX in both 1986 and 1987.

## 'New channel'

"From all indications I have, it's happening. A new channel has opened up in MIS departments to do business computing on the VAX. It's not just scientific and engineering any more," Kaufman said.

"In a lot of ways, the VAX marketplace is like the IBM market 10 years ago," he said.

A decade ago, according to Kaufman, a handful of software companies committed their resources to become major players in the IBM mainframe world, and "We have that critical mass" to do the same in the VAX marketplace today, he said.

Software International has been developing software for DEC computers for eight years and is believed to have revenue in the range of \$40 million. GE does not report on the subsidiary's revenue separately.

The firm is a cooperative marketing partner with DEC, meaning its salesmen make joint calls.

"We want to be the guy DEC has got its arm around when we walk through the door," Kaufman noted.

## Recent acquisition

The Andover firm recently acquired the financial software segment of Interactive Systems, Inc., a Lowell, Mass.-based supplier of DEC software.

Interactive Systems developed the basic Masterpiece applications for the VAX. Applications include general ledger, accounts payable, accounts receivable, fixed assets and payroll application software packages, according to the vendor.

By acquiring the financial software segment of Interactive Systems,

## Token-Ring gets DBMS

From page 35

SQL Talk Interactive Data manager and report writer, company spokesmen said.

It also includes the C language Application Program Interface for the development of applications that can access any SQL-based DBMS on the network.

SQLbase is the first relational database server to run under IBM's PC DOS instead of being a single-user system requiring a network file server to manage multiple users.

The product is also equipped with recovery features not available with single-user file servers, according to Gupta.

## Allows access anywhere on net

In addition to multiple users working with a single copy, the software is equipped to handle multiple copies of SQLbase on one network.

"Every time a server comes up, it broadcasts out what it has available to the network," Gupta declared. Users may then access data anywhere on the network through their local PC/AT server.

SQLbase is available immediately for \$995 in the single-user version and \$1,995 for the multiuser version, Gupta said.

Gupta Technologies, founded in 1984, is banking on the development of local-area networks (LAN) in the corporate environment.

Users of LANs will need to access different data bases from intelligent workstations and personal computers, and IBM's SQL provides the common access method, according to Gupta.

# INTRODUCING INTELLECT/DB2

## USING AI TO DELIVER DB2 TO MANAGEMENT

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### 2. AD HOC ANALYSIS

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# MICROCOMPUTERS



**MICRO BITS**  
William F. Zachmann

## QuadEGA+'s flying colors

**B**usiness color graphics is one area where the de facto industry standard established by the IBM Personal Computer was just not enough. Although the IBM Color Graphics Adapter (CGA) was a reasonable compromise between graphics capability and memory costs when it was first introduced five years ago, it clearly left a lot to be desired.

The low 320- by 200-pixel resolution of the CGA made text on the screen only marginally acceptable. Although demand for the CGA exceeded IBM's initial expectations, a large majority of business users preferred to do without color in order to obtain the more readable display of the higher resolution monochrome adapter and monitor.

In addition, the CGA was implemented with very limited memory and, as a consequence, very limited graphics capability. The low resolution and the ability to handle no more than four colors in graphics mode provided only the most rudimentary capabilities.

Despite all that, however, the appeal of color was so great that hundreds of thousands of CGAs and color displays were sold by vendors of compatible equipment, as well as by IBM. Scores of software packages written for the IBM PC, including nearly all of the more popular ones, made use of color on systems where it was installed.

The introduction of the IBM Enhanced Graphics Adapter (EGA) for the first time offered color graphics capability that opened the door to serious business graphics applications. The EGA's 640- by 350-pixel resolution and 8- by 14-pixel character cell made text just as easy to read as on the monochrome display. And, when configured with full memory, the EGA produced

See **QUADEGA+'S** page 48

Zachmann is vice-president of research at International Data Corp.

## Ashton-Tate fields user woes

### Product support sought at developer's seminar

By Peggy Watt

**LOS ANGELES** — While Ashton-Tate recently outlined a strategy of serving a spectrum of computing systems from micros to mainframes and sophisticated chips, many of its users clamored for improved support for existing products.

The exchanges occurred at the Ashton-Tate Developer's Conference, a recently held forum and series of workshops.

Ashton-Tate Chairman Ed Esber described product development plans that split into several paths, including maintaining the Intel Corp. 8088- and 8086-based systems that are still dominant. Esber assured users that Ashton-Tate would explore the latest arena of Intel 80286- and 80386-based systems, keeping "backward bridges" to earlier versions, but hinted that the firm will not wait too long for IBM to set the standard for the new generation of 80386-based systems.

If IBM waits too long to release such a system, other hardware firms will continue

the Microsoft Corp. MS-DOS path, and even an IBM system with some proprietary features will be forced to offer some link to MS-DOS for compatibility.

"Clearly, we're going to write to DOS and probably use something like Microsoft's Windows" to ensure MS-DOS compatibility, Esber said.

He also predicted a separate but steady development path for alternative Motorola, Inc. 68000-based technology led by Apple Computer, Inc.'s Macintosh.

Esber said connectivity is a priority, declaring he wants "to serve the breadth of the computing market, including mainframes and minis as well as micros, not by coming out with a mainframe data base," but by taking advantage of the gradually blurring distinctions between systems.

However, some outspoken attendees said Ashton-Tate has already adopted a "mainframe mentality" inappropriate for microcomputer software.

"Corporations are being ripped off because we have the money to pay," objected one attendee who asked not to be named. "I think you've structured your service prices after the mainframe world."

See **ASHTON-TATE** page 46

## Graphics, text tied by scanner

By Peggy Watt

**MILPITAS, Calif.** — Optical-scanner manufacturer Dest Corp. was expected last week to announce a new graphics scanner and software to import both graphics and text into desktop publishing applications.

The PC Scan Plus converts graphics to screen images and imports text to popular word processing programs. Like the original PC Scan introduced in January, it will be available for IBM Personal Computer and compatible systems first.

However, Dest promises an interface to Apple Computer, Inc.'s Macintosh by December, said Richard Amen, Dest president. A small computer systems interface (SCSI) port is already in place in preparation for the connection.

"We believe desktop publishing will grow substantially," Amen said, citing predictions by market research firm Dataquest, Inc. that IBM PC applications will

See **GRAPHICS** page 47

## System supports PC file exchange between DOS, Unix

By Eddy Goldberg

**LENEXA, Kan.** — Innovative Software, Inc. has announced a system that allows personal computer users to share data and files between Microsoft Corp. MS-DOS and Unix operating environments.

The system consists of three components: Innovative's Smart Software System 3.0 Unix version, the Smart Software System 3.0 MS-DOS multiuser version for local-area networks (LAN) and AT&T's Unix implementation of its Starlan network. The Smart Software System is an integrated business application software package consisting of a word processor, a data base manager and spreadsheet with graphics. The modules can also be used in a stand-alone mode.

"This is the first step the industry has seen to allow a totally transparent, seamless Unix/DOS connection," said Ronald G.

See **SYSTEM** page 47

### INSIDE

Micrografx to release Windows application/46

### NEW THIS WEEK

■ Xerox adds Screen on Image feature to its Faxmaster software

■ For more on this and other new products, see pp. 115-139.

### INSTANT ANALYSIS

"I am not the VP in charge of pre-announcements."

— Jean-Louis Gasse, vice-president, product development at Apple Computer, Inc., when asked to comment on future products from third-party Macintosh software developers

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## MICROCOMPUTERS

# Micrografx to add Windows presentation graphics application

By Peggy Watt

RICHARDSON, Texas — Micrografx, Inc. will soon add a presentation graphics product, Windows Graph, to its graphical programs designed to run under Microsoft Corp.'s Windows interface.

An early supporter of Windows, Micrografx has announced updates of Win-

dows Draw and In\*A\*Vision, its other graphics products, and a selection of ready-made graphics, Clip Art Collection, for use with these products.

Windows Graph can be used to produce many business and presentation graphics, including three-dimensional images, Paul Grayson, Micrografx chairman, said.

The charts can then be pasted into PageMaker, Aldus Corp.'s page design program, or other products that run under Windows.

Data is loaded or entered in chart or numerical graph form, Grayson said. Windows Graph's data import facilities will include directly reading Lotus 1-2-3 and data interchange format files.

Windows Graph is expected to be announced at a Windows Developers Conference later this month and will be available early next year, according to Ken Mecca, Micrografx's marketing director.

He said Windows Graph will be priced between the two related Micrografx products. Windows Draw is \$199 and In\*A\*Vision, marketed as

a computer-aided design system, is priced at \$495.

Windows Draw and Windows Graph will include the Windows run-time version. Mecca said the Windows run-time will be included with Micrografx Windows applications "as long as necessary" until Windows is widely used as an operating environment.

## Ashton-Tate fields woes

From page 45

The systems manager complained that other, lesser known companies offer free support.

Under Ashton-Tate's corporate support program, businesses get a support representative assigned to them, toll-free support, discounts on training and support and some product previews for a yearly fee of \$4,000.

Software care programs offer either annual maintenance with a single price per product and free upgrades for a year or staggered volume discounts.

Esber defended the support program. "Many small companies will start by offering you free support, but no one can give you support for free," he said, adding that Ashton-Tate makes no profit on its support fees. "The volume purchase price is built into the software price," he noted. "The support cost is a people cost."

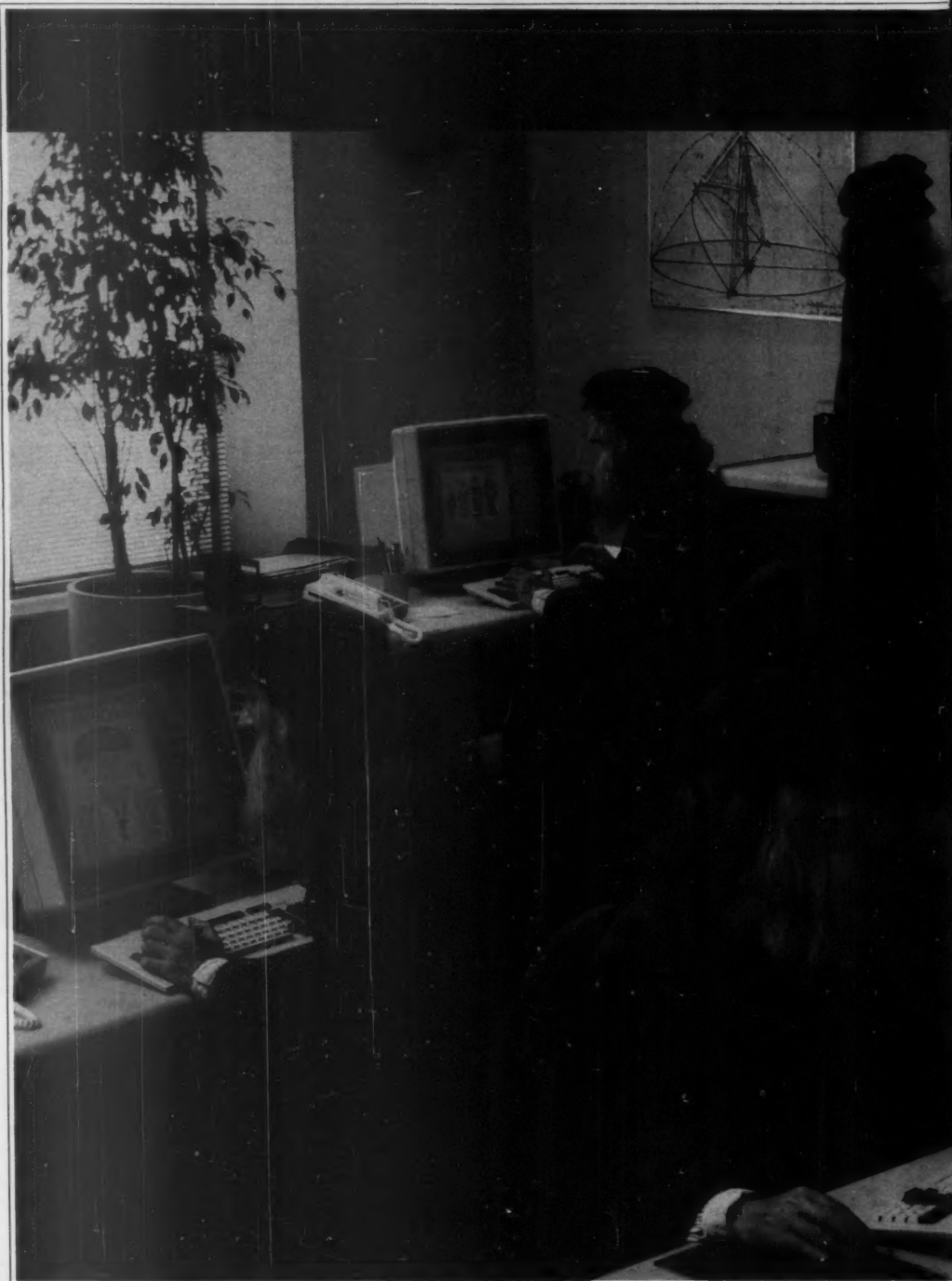
Esber said there have been complaints, but that no changes will be made in service policy soon.

"Any time you go to a point from free to cost, you'll have some complaints," he declared. "It's important for us to listen. Perhaps we're not communicating what the user gets for his dollars." More often, he said, he is asked how Ashton-Tate can cover its own cost of providing support service.

Many questions require a great deal of effort to answer, some users agreed. "When we call [Ashton-Tate] Support, we've already screened the problem," said Peter LeMay, consultant with Automated Business Development in Malden, Mass.

Esber agreed, "If the person is serving as a funnel and only coming to us with the tough questions, then it costs us more to answer each one."

Not all users were disgruntled, however. "You don't get something for nothing," said Rod F. Gully, a consultant with The Quilcene Corp. in Walnut Creek, Calif. "The cost of support is real."





## MICROCOMPUTERS

## Graphics, text tied together

From page 45

overtake the market now dominated by the Macintosh and that the combined market will more than triple to exceed \$5 billion by 1989.

"We want to provide tools for either the Macintosh or the IBM PC user's publishing projects," Amen said.

The PC Scan Plus scanner, running Dest's Publish Pac software with an interface to an IBM PC or compatible system, can separately import text and graphics, including photographs and line drawings, into several desktop publishing programs.

It directly supports the tagged image file format used by Pagemaker from Aldus Corp. It sends images to other programs through the PC Paintbrush Plus drawing program from Z-Soft Corp.,

which will be bundled with Publish Pac, claimed Donata Anderson, Dest manager of corporate communications.

The scanner and software provide halftone screening in 16 lines of gray, and Publish Pac can send that image to a laser printer for a 75-line screen output. (Most newspaper-quality halftones use at least 85-line screens.)

The software retains much of the on-screen interface of PC Text Pac, which ran with the original PC Scan

and imported text to eight word processing formats.

It also runs under Microsoft Corp.'s Windows, which is used by Pagemaker on the IBM PC. Publish Pac accommodates but does not require a mouse.

Publish Pac for the IBM PC and compatibles is priced at \$595 and available immediately, Anderson said. The Macintosh version will be available in December, along with the Macintosh interface to PC Scan Plus.

The scanner is priced at \$2,495, and the IBM hardware interface is \$295. PC Scan Plus is based on an Intel Corp. 80186 microprocessor, contains 768K bytes of random-access memory and scans at 200, 240 or 300 dots per inch, in order to correspond with standard laser printers.

The original text-only PC Scan will still be sold for \$1,995. Current owners of PC Scan can upgrade to PC Scan Plus for \$795.

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## System links DOS, Unix

From page 45

Ferguson, vice-president of marketing for Innovative.

Up to 32 MS-DOS users can be connected to each AT&T Unix PC file server over a Starlan network, with the possibility of adding more Unix PCs to the network to act as additional servers. However, in terms of performance, the Unix PC is designed to support from one to five heavy users, according to Kevin F. Redden, a member of AT&T Information Systems Laboratories in Freehold, N.J.

The MS-DOS and Unix versions of the Smart software reside on the same server, the Unix PC, in separate partitions. The Unix PC file server accommodates both system environments.

### Consistent format used

Both the MS-DOS and Unix versions of the Smart software use a consistent format across the two operating environments, allowing data to be moved from an MS-DOS machine to a Unix machine. The difference in operating systems is transparent to the user, who sees an identical interface on a Unix or MS-DOS machine.

Smart's data files can be used in both MS-DOS and Unix environments. For example, a data disk created on a MS-DOS personal computer can be inserted into a Unix PC, read without file conversion and used in the Unix environment.

Innovative's Smart LAN for MS-DOS contains automatic file and record locking in the data manager and file locking in the word processor and spreadsheet. Multilevel password protection down to the screen level is also provided.

The MS-DOS user gains data compatibility and network productivity, as well as the ability to move to the more powerful Unix PC, according to the vendor. The Unix user can use MS-DOS business applications and exchange data with other departments using MS-DOS computers.



## MICROCOMPUTERS

## QuadEGA+'s flying colors

From page 45

16-color graphics displays that were more than adequate for the vast majority of business applications.

Although not really up to the standards of much more expensive computer-aided design (CAD) workstations in graphics, the EGA proved

to be good enough for many basic CAD applications. A number of design programs using the EGA are now available.

Initially, however, acceptance and use of the EGA has been relatively limited. There are two main reasons for this. The first is cost. The IBM EGA board was initially rather expensive, especially when purchased with the additional memory required for full graphics capability. And, of course, the IBM En-

hanced Color Display, listing at \$849, was quite a bit more expensive than the lower resolution Color Display.

The second reason for slow initial acceptance was that the EGA did not include an option to run in a CGA-compatible mode to handle software designed to make use of graphics on the earlier board. Since very little software was available for the EGA at first, this became an obstacle to acceptance. And since initial acceptance was

slow, many software developers were in no hurry to make use of the EGA.

By offering both lower cost as well as the ability to emulate the CGA, Quadram Corp.'s QuadEGA+ card has become one of the most widely used compatible alternatives to the EGA.

List priced at \$595 fully configured with 256K bytes of display memory, the QuadEGA+ can also operate in standard IBM monochrome graphics mode and

can emulate the very popular monochrome Hercules Computer Technology, Inc.'s Graphics Card as well. It is also warranted by Quadram for two years. Quadram also sells a crisp Quadchrome Enhanced Display for \$795.

Easily installed in typical fashion, the QuadEGA+ has a single bank of switches that are set to indicate what type of adapter it is normally to function as, and what other display boards, if any, are installed on the system. A toggle switch mounted behind the system so that it can be reached externally allows the QuadEGA+ to be easily configured for either an enhanced color display or a monochrome or standard color display.

Software that comes with the QuadEGA+ includes QEGA.COM, a program that functions as an extension to DOS and makes it very easy to switch from one mode of operation to another.

For example, if you are using the board with the enhanced display but want to run older software (such as early versions of Lotus De-

”

**QuadEGA+ has become one of the most widely used compatible alternatives to EGA.**

velopment Corp.'s 1-2-3) written to use the display adapter registers on the CGA, you simply type QEGA:CGA:ON to provide CGA emulation.

Another handy feature of the QEGA command is a screen-saver feature that can be used to automatically turn the display off if the system has not been used for some time. The display comes back on as soon as a key is pressed on the keyboard. This helps prevent "burn in" of the screen phosphors and prolongs the useful life of the display.

Believe me, once you have started using an enhanced display with EGA graphics, only dire necessity will be sufficient to force you back into the dreary world of monochrome or CGA color.

What's more, windowing environments like Microsoft Corp.'s Windows and Digital Research Inc.'s Gem will suddenly start looking like much more realistic and practical future directions for you.

Quadram's QuadEGA+ is an attractively priced and flexible entry into the world of EGA graphics. Already a successful product, it has a great deal to offer users and is certainly a worthwhile alternative.

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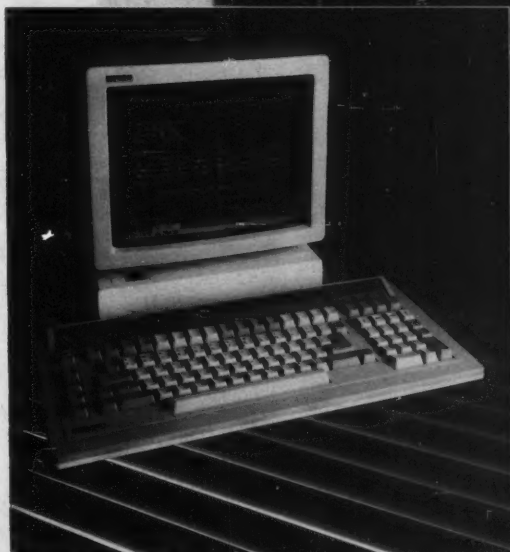
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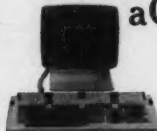
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# Hardware Roundup

Edited by Barbara Wierzbicki

## Small systems

By DONNA RAIMONDI

***As more vendors extend their minicomputer lines downward with proprietary chip-based small systems, more software applications become available to the small business or corporate departmental user.***

The small systems market — supermicros, minicomputers and the low end of traditional superminis and business systems — remains volatile and competitive despite the computer industry slump.

In the U.S., approximately 232,000 small machines will ship in 1986, according to International Data Corp. (IDC) figures. This number would bring the tally of systems in use to 1.6 million. According to Framingham, Mass.-based IDC, domestic shipments will top 387,000 by 1990 for a cumulative total of 2.9 million small systems in use.

Sales of small computers will surpass those of mainframes and microcomputers in the next few years because of the superior price/performance ratio, the relative simplicity of manufacturing compared with large systems and the ease of use of the small computer.

Not only have the Motorola, Inc. 68020 and other off-the-shelf 32-bit chips led to dramatically better price/performance figures, but the Intel Corp. 80386 chip promises to vastly expand the address space available to legions of applications software packages written for Microsoft Corp.'s MS-DOS operating system.

"Part of the promise of the 80386 is that vendors will be able to better link the personal computers that are already installed with supermicros, multiuser micros or file servers based on the 386 chip," says Sandy Gant, vice-president of small systems services at Infocorp, a Cupertino, Calif., market research firm.

Small systems are playing a major role in the area of networking, the buzzword for 1985 and 1986. Companies want to interconnect departmental systems to mainframes.

Small systems are acting as file servers for microcomputers, allowing users to access vital information from the host or to communicate with other users in the company through electronic mail or messaging.

Major minicomputer and mainframe vendors — like Digital Equipment Corp., NCR Corp. and Honeywell, Inc. — make their own chips to run supermicros, which make up an increasingly important category of small systems.

In 1985, for instance, DEC shipped more than 9,000 units of its proprietary-chip-based 2-year-old Microvax II — not including the Vaxstations based on it. As more large vendors extend their minicomputer lines downward with proprietary-chip-based small systems, more software applications become available to the small business or corporate departmental user.

In addition to the growth in proprietary architecture systems such as that of the Microvax, Unix-based open architecture systems are also

doing well.

Nearly 30 vendors are shipping Unix-based systems in the small marketplace, and this market accounts for the largest number of Unix-based units and the largest share of Unix revenue in 1985, according to IDC. Unix machines constitute 21% of all small systems shipped in 1985. According to IDC predictions, that figure will grow slowly to 22% this year and to 26% by 1990.

Tandy Corp. emerged as an important presence in this market by selling 14,000 Microsoft Xenix-based Tandy 6000 systems. AT&T showed up in small systems too, shipping about 8,350 3B2 systems.

"AT&T has very deep pockets, so it is heavily promoting systems like its 3B2 family," Infocorp's Gant says. Altos Computer Systems, Inc. approached Tandy's success by shipping 13,000 units, mostly Xenix-based systems.

"Altos is doing well because they stick with what they know how to do," says Elizabeth Levy, a Dataquest, Inc. industry analyst. The

company has increased the reliability of its systems and is building its product base in a consistent fashion, she says. "We are starting to get calls from major vendors about Altos, which shows that they are serious competition now," she adds.

But the real battle in the small systems market rages most vigorously between the two superpowers — IBM and DEC. IBM, the market share leader in small systems, increased only from 22.5% to 23.2% in 1985, the last year for which there are figures, according to IDC.

Yet, despite flat 1985 small system shipments, IBM was not idle. Big Blue shipped the same number of System/36s out the door that it did in 1984 — 33,000 of them.

"IBM clearly has the lion's share of this market," Dataquest's Levy says. "The spectacular success of the System/36 Model 5360 accounts for most of small systems sales, and it was sold mostly to small businesses." Dataquest estimates that only 12% of

System/36s have gone into departmental processing roles in larger companies, a fact Levy attributes to memory limitations and the System/36's former inability to talk to IBM mainframes and Personal Computers.

Until recently, small systems users were not asking vendors for PC-to-mini-to-mainframe connectivity, Levy says. "They were more concerned with installing PCs than in sharing them."

While there are many industry analysts that condemn IBM's System/36, labeling it a dismal failure as a departmental computer, announcements made in July show that it may yet have a future.

Along with the three new models — which include a high-end version that has three times the memory of the earlier Model 5360 — Big Blue also released versions of both the System/36's SSP and System/38's CPF operating systems with peer-to-peer communications abilities between the systems.

Users will be able to log on to a System/38 via a System/36, a situation that could lead to use of the System/36 as a text processor while the companion System/38 performs data base management tasks. A single system could eventually replace both, but the next step is likely to be running System/36 as a guest under System/38, IDC says.

Available later this year or in early 1987, the new systems should provide an upgrade path to current customers. Whether the systems stir activity in the stagnant System/36 sales remains to be seen.

When IBM announced the new System/36s, it also released a small version of the System/38, the Model 100. The price range of this model over the System/36 high-end offering.

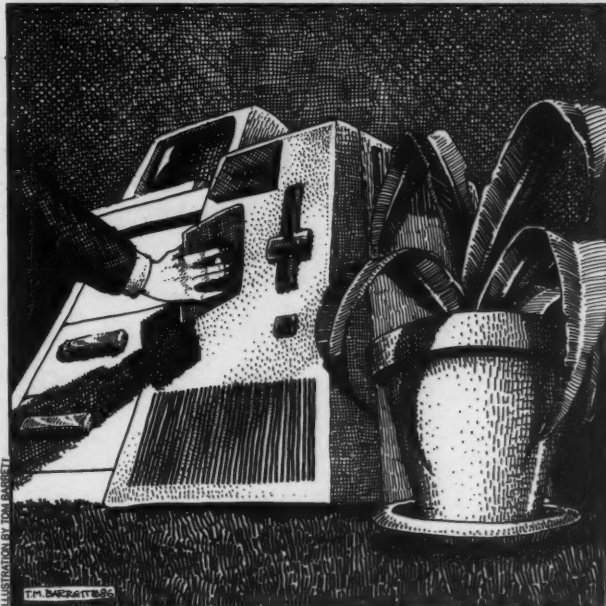
"I don't see the overlap as a big deal," Dataquest's Levy says. Users of System/36 want easy, friendly systems with good office functionality, whereas the more sophisticated users of System/38 are looking for data base management features, she says.

All of IBM's improvements may not be enough to save it from falling into second place in the small systems marketplace by 1990, says Gartner Group, Inc. Vice-President Craig Symonds. "We believe that by 1990, DEC will surpass IBM in market share in the \$15,000 to \$250,000 range," he says.

The Microvax coup has helped raise DEC's small systems market share from 9.8% to 11.3% in 1985. While the Microvax and the lower end of the new 8000 series systems, such as the 8200, gathered momentum, DEC continued selling systems in its older PDP-11 family of computers. DEC's success has led to a 25% increase — to \$1.4 billion — in worldwide revenue in small systems.

Data General Corp., Prime Computer, Inc. and Wang Laboratories,

Continued on next page



Raimondi is a Computerworld senior writer.



## Hardware Roundup/Small Systems

## Roundup '86 setup

This year's roundup was compiled by *Computerworld* using questionnaires mailed to vendors of personal computers, small, medium-scale and large systems.

Wherever possible, the International Data Corp.'s (IDC) definitions for these categories were used in order to place the small systems in groups with their likely competitors.

This week we cover small systems market. The Hardware Roundup will then conclude on Oct. 20 with a look at the microcomputer industry.

The small systems group — 16-bit minis, 16- and 32-bit superminis, and low-end versions of traditional 32-bit superminis and business systems — is defined by IDC as the following: computers costing from \$10,000 to \$100,000 and typically configured for two to 16 users in a commercial environment in which the number of users is a valid measure of system performance.

In addition to commercial environments, small systems are found doing communications processing in addition to automation and control functions — applications in which the number of users is rela-

tively unimportant.

Some vendors may object to their machines being classified as small systems. Use of the IDC classifications is intended to position systems with their likely competitors regardless of what the vendor calls the product.

In cases where vendors did not supply the requested information, *Computerworld* filled in the blanks, wherever it was possible, using earlier vendor literature or statements.

Responses that are listed as "NA" represent those instances in which a manufacturer either failed to answer a question or in which the question did not apply to a vendor's system.

Many of the estimates deal with performance as measured in terms of millions of instructions per second (MIPS). Estimated internal-throughput performance numbers are offered only as a guide for users to position a system within the grouping.

The numbers are listed with the understanding that some vendors object to their use, although some of those same vendors use their own MIPS numbers in their product announcements or competitive analyses.

— DONNA RAIMONDI

## Major small systems players

Continued from previous page

Inc. all announced products competitive with DEC's Microvax II, but so far none has outsold the Microvax.

Wang's VS 5 and VS 6, DG's MV2000 and Prime's 2350 and 2450 have failed to catch on, despite claims that those machines perform better than a Microvax for Cobol and some other applications. "You can't compare these machines to the Microvax II on a system-by-system basis," Dataquest's Levy says.

"The Microvax II is a success because it is a VAX that runs a lot of prepackaged application software that does not need Cobol, so the Microvax's lack of good Cobol facilities is not the criteria," she adds.

Gartner Group's Symonds cites a recent study that shows 45% of Microvax IIs are going into commercial DP sites. At the same time, Wang's users are undergoing a fundamental reevaluation of their relationship with the vendor, he says. "Wang has typically been an office automation, word processing supplier, and now they are trying to come back and be viewed as a DP supplier. So people are looking at Wang, and not having made up their minds if Wang is a viable DP vendor, that is hurting the VS 5 and VS 6 sales."

Wang is clearly losing market share in small systems, and Gartner Group projects that trend will continue. "The company has to solve a number of problems," Symonds says, problems of credibility, service, management of the company and product development. He sees Wang as being 18 to 24 months behind the other major vendors in vital areas like networking. "Wang made a fundamental strategic blunder several years ago when it thought it was big enough to set its own standards, like Wangnet. It turns out they were at odds with what the industry is now doing," Symonds says.

While Wang scrambles to make

good and has already released some of the software it needs to bring itself up to date, it still is almost two years behind DEC in connectivity and networking software. DEC's strategy in following up on the Microvax success has not been clear. Despite rumors of a 1986 release of Microvax III, which would incorporate DEC's VAX architecture more completely, this no longer seems to be the course DEC will take. "There is no reason to mess with Digital's runaway success," IDC says.

An August Yankee Group conference in New York predicted that DEC will release a 2.5-million-instructions-per-second Microvax II, but not until the fourth calendar quarter of 1987. At the spring DECUS users group meeting in Dallas, DEC demonstrated an Ethernet-based clustering capacity for Microvaxes that the company may be ready to announce as a product by the end of 1986, according to the Yankee Group.

While IBM and DEC account for the largest shares in the small systems market — almost 30% of unit shipments and approximately 33% of value according to IDC — other vendors combine to make up the rest.

Both NCR's unit shipments and value of systems shipped jumped from 1984 figures by more than 25%, leaving the company in fourth place with 6% of the small systems market in 1985, according to IDC figures.

NCR's Tower products, while primarily being used as technical machines, do provide Unix-based business solutions, Levy says. "A lot of other companies are watching the Tower because it is doing so well."

Hewlett-Packard Co., the third-place vendor, lost market share slightly from 6.5% to 6.3%, while increasing the value of shipments

Continued on page 54

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 9:00-10:00 FOCUS for Data Analysis Applications  
 10:30-10:45 Refreshment break  
 10:45-12:15 FOCUS for Database/Data Management Applications

#### 1986 Fall Seminar Schedule

Atlanta, GA Tue Oct 14  
 Hyatt Ravinia, Atlanta  
 Austin, TX Wed Oct 22  
 Stephen F Austin Hotel, Austin  
 Baton Rouge, LA Tue Oct 14  
 Embassy Suites, Baton Rouge  
 Boston, MA Thu Nov 6  
 Boston Marriott, Newton  
 Charleston, WV Thu Oct 16  
 Charleston Marriott  
 Chicago, IL Tue Oct 28  
 Marriott Oak Brook, Oak Brook  
 Chicago, IL Thu Nov 6  
 Westin Hotel, Chicago  
 Cincinnati, OH Thu Oct 30  
 Hyatt Regency, Cincinnati  
 Cleveland, OH Thu Oct 23  
 Cleveland Airport Marriott  
 Danbury, CT Tue Oct 28  
 Danbury Hilton Inn  
 Detroit, MI Thu Oct 16  
 Michigan Inn, Southfield  
 Detroit, MI Tue Nov 18  
 Somerset Inn, Troy  
 Greensboro, NC Mon Oct 20  
 Greensboro High Point Marriott  
 Hartford, CT Thu Oct 9  
 Sheraton, Hartford  
 Honolulu, HI Thu Oct 9  
 Westin Ilika, Waikiki  
 Houston, TX Thu Oct 9  
 Marriott West Loop, Houston  
 Indianapolis, IN Thu Oct 23  
 Hyatt Regency, Indianapolis  
 Kansas City, MO Thu Oct 16  
 Hyatt Regency, Kansas City  
 Knoxville, TN Thu Nov 6  
 Hyatt Regency, Knoxville  
 Long Island, NY Thu Nov 13  
 Sheraton, Smithtown  
 Los Angeles Area, CA Tue Oct 28  
 Sheraton at Universal City,  
 San Fernando Valley  
 Los Angeles Area, CA Thu Nov 6  
 Anaheim Hilton & Towers  
 Minneapolis/St. Paul, MN  
 Thu Oct 30  
 Minneapolis Plaza, Minneapolis  
 Morristown, NJ Tue Oct 28  
 Madison Hotel, Morristown  
 Nashville, TN Thu Oct 9  
 Nashville Marriott  
 New Orleans, LA Wed Oct 15  
 New Orleans Marriott  
 New York, NY Thu Oct 30  
 Vista International, New York  
 Omaha, NE Thu Nov 6  
 Red Lion Inn, Omaha  
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 Hyatt Orlando, Kissimmee  
 Philadelphia, PA Wed Oct 15  
 Hershey Hotel, Philadelphia  
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 Sheraton Scottsdale Resort  
 Portland, OR Tue Oct 21  
 Alevis Hotel, Portland  
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 Richmond Marriott  
 Salt Lake City, UT Tue Nov 25  
 Salt Lake City Marriott  
 San Antonio, TX Tue Oct 21  
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 San Diego, CA Thu Oct 30  
 Sheraton Harbor Island West, San Diego  
 San Francisco, CA Thu Nov 20  
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 Seattle, WA Thu Oct 23  
 Four Seasons Olympic, Seattle  
 St. Louis, MO Thu Nov 13  
 Stouffer Concourse Hotel, St. Louis  
 Syracuse, NY Wed Oct 15  
 Syracuse Marriott  
 Tallahassee, FL Thu Oct 23  
 Tallahassee Hilton  
 Washington, DC Fri Oct 31  
 J W Marriott Hotel, Washington

#### CANADA

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 Skyline Hotel, Calgary  
 Montreal, PQ Wed Oct 15  
 Le Centre Sheraton, Montreal  
 Ottawa, ON Tue Oct 14  
 Westin Hotel, Ottawa  
 Toronto, ON Mon Nov 3  
 Holiday Inn, Toronto  
 Vancouver, BC Tue Oct 28  
 Westin Bayshore, Vancouver



## Hardware Roundup/Small Systems

Continued from page 52

from \$720 million to \$780 million. "HP is going to be a major player here," Levy says. "They have been changing over from the 16-bit 3000 series to a whole new 32-bit Spectrum line, so they have slowed down. As their user base is solid and very loyal, I expect Spectrum will generate a lot of interest next year."

HP and NCR will both increase their market shares in the next few years, Gartner's Symonds says, but they will not hold a markedly different position in their places on the charts. "We are projecting a small growth in market share for HP, and we believe both NCR and Prime will grow slightly," he says. "Prime is excellently managed; it has stuck very rigidly to what it does best — build 32-bit minis — and it hasn't wavered from that track or diluted its efforts or squandered resources chasing after things that it shouldn't chase. It has also made major investments in computer-aided design and manufacturing, and it is that market that is really beginning to fuel Prime's growth faster than the overall mini marketplace," he adds.

While fifth-place Burroughs Corp. grew from 4.5% of the 1984 market, with a value of \$500 million, to 4.8% market share and a value of \$590 million, sixth-place Wang did better.

Wang increased from 3% of 1984 market share, and \$330 million in value, to a 1985 showing of 3.9%, a \$480 million value. The Lowell, Mass.-based company is said to be working on an umbrella operating

system that can accommodate the Pick Systems Pick and Unix operating systems as well as proprietary systems, "like a virtual machine operating system," Levy says. "If that is the case, and it's an ambitious project, it would be an attractive development for some MIS people because it would give them flexibility."

DG and Texas Instruments, Inc., eighth and ninth on IDC's list of major shares in the small systems market, both fared poorly in 1985. DG fell from a 3.8%, \$420 million share to 3.2%, with a value of \$390 million. DG seems to have done exactly what Prime did not do, according to Symonds. DG has spread itself thin by trying to compete with much larger companies. IBM at \$50 billion and DEC at \$6.7 billion are too large for \$1 billion DG to match.

"DG hasn't been doing poorly because of lack of products or technology. DG's are as good as anybody's and better than some. In fact, if you look at their systems network architecture capability, vis-a-vis IBM,

they are better even than DEC is,"

Symonds says. Its problem is that it is too small to compete successfully where IBM and DEC do and that it lacks a distribution capability.

"They have had to devote a lot of time and resources to staying competitive technologically. Consequently, they haven't been able to put the same kind of investment into getting more salesmen out there calling on more people. DG hasn't been able to penetrate the Fortune 500 or Fortune 1,000 companies nearly to the extent that is required," he says.

Infocorp's Gant says that DG and others are just now suffering from the marketplace slump, a condition she does not expect to change until 1987. "I am predicting that there will be fewer units sold in 1986 than in 1985. I know there are some pockets of success, but overall, I'm very pessimistic."

Gant says 1986 is a year of transition, when vendors are starting to deliver on some of the communications capabilities that were promised

at the departmental systems level. The standards organizations have several levels of standards approved, and corporations are having to link all the PCs they bought in the past. "Buyers are not as excited about the machines as they were two years ago. There is no new reason to buy this year," she adds.

TI's share dropped from 2.7%, \$300 million in 1984 to 2%, \$250 million in 1985. "Dataquest figures from '84 to '85 show TI dropping a couple of places," Levy says. She attributes the fall to an older product line, a proprietary operating system based on older technologies and a marketing effort that moves primarily through value-added resellers so that TI is not highly visible.

The company's March release of the TI1500 and TI's attempts to help its customers migrate easily to the new 1000 series systems as they come along should help them out for 1986 and 1987, she says. "The new systems will attract small and medium-size firms to TI products."

Sperry Corp.'s value of systems shipped remained flat at \$230 million, while its market share decreased from 1984's 2.1% to 1985's 1.9%. Honeywell and Prime both increased their market share slightly during 1985.

"Honeywell has some decent products," Symonds says. "But again, they are in a similar situation to DG. They don't have a big installed base to leverage off of. And they are going up against a lot of very entrenched, tough competition."

— Sandy Gant  
Infocorp

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## Hardware Roundup/Small Systems

## SMALL SYSTEMS

|   | Date First Installed | Primary Market  | Most Compatible DEC or IBM System                             | Performance in MIPS | Performance (millions of Whetstones/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Maximum I/O Bandwidth (M bytes) | Ports/Channels       | Operating System                  | Maximum Number of Users | Typical Number of Users | Word Length (bits) | Base Price                                 |
|---|----------------------|---|---|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------------|-----------------------------------|-------------------------|-------------------------|--------------------|--|
| <b>Alpha Micro</b><br>3501 Sunflower<br>Santa Ana, Calif. 92704<br><i>AM-1000 series</i>                            | 1982                 | Commercial DP, office/distributed processing  | Digital Equipment Corp. Microvax II, IBM System/36, System/38 | .6                  | NA  | 1-3.5                       | 35 <sup>1</sup>                   | NA                              | 11                   | AMOS/L, Unix                      | 11                      | 3-7                     | 7                  | \$11,730 (1M byte)                         |
| <i>AM-1500 series</i>   | 1985                 | Commercial DP, scientific/engineering, transaction processing (TP), office/distributed processing | IBM System/36, DEC VAX 11/730                                 | 1                   | NA  | 2-16                        | 5M bits                           | NA                              | 6                    | AMOS/L                            | 120                     | 30                      | 16                 | \$20,665 (2M bytes)                        |
| <b>Applied Digital Data Systems, Inc.</b><br>100 Marcus Blvd.<br>Hauppauge, N.Y. 11788<br><i>Mentor 1700 series</i> | March 1986           | Office/distributed processing   | IBM Personal Computer AT                                      | NA                  | NA  | 512K                        | 25 <sup>1</sup>                   | 16 bits                         | 8                    | Pick Systems Pick                 | 3-8                     | 3-6                     | 8                  | \$6,195-\$10,995 (512K bytes)              |
| <i>Mentor 2500</i>  | 1984                 | Office/distributed processing   | NA  | NA                  | NA  | 512K-1                      | 25                                | 16 bits                         | 16                   | Pick                              | 16-32                   | 20-24                   | 16                 | \$27,000 (512K bytes)                      |
| <i>Mentor 4000XP</i>  | February 1986        | Office/distributed processing   | NA  | NA                  | NA  | 512K-1.5                    | 45 <sup>1</sup>                   | 16 bits                         | 16                   | Pick                              | 32                      | 20-24                   | 16                 | \$49,500 (512K bytes)                      |
| <i>Mentor 5500 series</i>   | 1985                 | Office/distributed processing   | NA  | NA                  | NA  | 512K-1.5                    | 27 <sup>1</sup>                   | 16 bits                         | 32                   | Pick                              | 64                      | 45-50                   | 16                 | \$62,000-\$67,000 (512K bytes)             |
| <i>Mentor 6000 Models 4, 6, 8</i>   | NA                   | Office/distributed processing   | IBM System/36, DEC Microvax II                                | NA                  | NA  | 2-16                        | 5                                 | NA                              | 16                   | Pick                              | 64-160                  | 32-90                   | 32                 | \$36,000 (2M bytes) - \$115,000 (4M bytes) |
| <b>Arete Systems Corp.</b><br>2040 Hartog Drive<br>San Jose, Calif. 95131<br><i>Arete 1100</i>                      | 1983                 | TP  | DEC Microvax II   | 2.2-4               | NA  | 2-16                        | 2.4                               | 25                              | 15                   | Arix (Unix 5.2)                   | 160                     | 40                      | 32                 | \$46,000 (4M bytes)                        |
| <i>Arete 1200/1600</i>  | 1984                 | TP  | IBM 4381  | 2.2-7               | NA  | 2-16                        | 2.4                               | 2.5                             | 33                   | Arix (Unix 5.2)                   | 256                     | 64                      | 32                 | \$55,000-\$67,000 (4M bytes)               |
| <b>AT&amp;T</b><br>1 Speedwell Ave.<br>Morristown, N.J. 07960<br><i>AT&amp;T 382/300</i>                            | 1984                 | Commercial DP, office/distributed processing  | IBM System/36, DEC Microvax II                                | .6                  | 9 kWhets <sup>2</sup>                     | 1-4                         | 5M bits                           | 2                               | 22                   | Unix System V                     | 18                      | 6-10                    | 32                 | \$12,845 (1M byte)                         |
| <i>AT&amp;T 382/310</i>   | 1985                 | Commercial DP, office/distributed processing  | IBM System/36 5362, DEC Microvax II                           | 1.1                 | 265 kWhets <sup>2</sup>                   | 1-4                         | 5M bits                           | 2                               | 22                   | Unix System V                     | 18                      | 10-14                   | 32                 | \$14,845 (1M byte)                         |
| <i>AT&amp;T 382/400</i>   | 1985                 | Commercial DP, office/distributed processing  | IBM System/36 5362/5360, DEC Microvax II                      | 1.1                 | 265 kWhets <sup>2</sup>                   | 1-4                         | 5M bits                           | 2                               | 57                   | Unix System V                     | 46                      | 15-25                   | 32                 | \$20,845 (1M byte)                         |
| <b>Burroughs Corp.</b><br>One Burroughs Place<br>Detroit, Mich. 48232<br><i>XE520 Shared Resource Processor</i>     | 1984                 | Office/distributed processing   | IBM System/36   | NA                  | NA  | 7                           | 5M bits                           | 11 (burst mode)                 | 19                   | BTOS                              | 64                      | 32                      | 16                 | \$19,000 (1M byte)                         |
| <i>XE550</i>  | 1984                 | Commercial DP   | IBM System/36, DEC Microvax II                                | NA                  | NA  | 16                          | 5M bits                           | 11 (burst mode)                 | 19                   | Centix (enhanced Unix System V.2) | 64                      | 24                      | 16                 | \$25,000 (2M bytes)                        |
| <i>B1990SP/B1990DP</i>  | 1983                 | Commercial DP   | IBM System/38-6   | .55*                | NA  | Up to 2                     | Up to 10                          | 144                             | 11                   | Master Control Program (MCP)      | 256                     | 64                      | 24                 | \$62,265 (512K bytes)                      |
| <i>A 2</i>  | 2nd quarter 1986     | Commercial DP   | IBM System/36   | .36*                | NA  | 6-9                         | 1.2                               | NA                              | Up to 8 <sup>3</sup> | MCP                               | NA                      | NA                      | 52                 | \$60,000 (6M bytes)                        |
| <b>Byteworks Corp.</b><br>295-D N. Rampart St.<br>Orange, Calif. 92668<br><i>Mikron 400 system</i>                  | 1982                 | Commercial DP   | NA  | NA                  | NA  | 128K                        | NA                                | NA                              | 8                    | Bits, Iris, Bliss/Cobol, Micos    | 32                      | 12-16                   | NA                 | \$5,000                                    |

The companies included in this chart responded to a recent written survey conducted by Computerworld. Further product information is available from the vendors.

CW chart compiled by Barbara Wierzbicki.

\* CW estimates based on vendor-supplied information.

<sup>1</sup> Measured in milliseconds.

<sup>2</sup> Performance measured in double precision Whetstones.

<sup>3</sup> Data Link Processors (DLP). Burroughs uses data link processors in place of conventional channels.

\* Performance is measured in transactions per second (TPS).







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The TeleVideo 9220. If you'd like more information, or the name of your nearest distributor, call 800-835-3228, Dept. 131. In the meantime, we'd like to leave you with a quote from Susan Kennedy, "Keeping customers happy is what my job is all about. And TeleVideo definitely makes my job a lot easier."

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Amsterdam: 31.2503.35444, Paris: 33.1.4687.34.40, London: 44.9905.6464



## Hardware Roundup/Small Systems

|  | Date First Installed | Primary Market   | Most Compatible DEC or IBM System | Performance in MIPS | Performance (millions of instructions/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Maximum I/O Bandwidth (M bytes) | Ports/Channels | Operating System                              | Maximum Number of Users | Typical Number of Users | Word Length (bits) | Base Price                                |
|--|----------------------|--|-----------------------------------|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------|---|-------------------------|-------------------------|--------------------|---|
| <b>Series 4000/5000</b><br>4100/5100,<br>4300/5300   | 1981                 | Commercial DP  | NA                                | NA                  | NA  | 128K-512K                   | NA                                | NA                              | 16             | Bits, Iris, Blis/Cobol, Micos                 | 64                      | 16-64                   | 16                 | \$5,000-\$8,000                           |
| <b>Celecity Computing</b><br>9692 Via Excelencia<br>San Diego, Calif. 92126<br><i>C1200</i>                            | 1984                 | Scientific/engineering   | DEC 8200-8300                     | 8                   | 2.3   | 4-24                        | 2.5                               | 6                               | 13/1           | University of California at Berkeley Unix 4.2 | 32                      | 8                       | 32                 | \$38,000 (4M bytes)                       |
| <b>Charles River Data Systems, Inc.</b><br>983 Concord St.<br>Framingham, Mass. 01701<br><i>Universe/200, 400</i>      | October 1986         | Special purpose  | DEC VAX-11/780                    | 1-3.5               | NA  | 1-16                        | 12-15                             | 20-40                           | 4-64           | AT&T Unix System V                            | 32-64                   | 3-12                    | 32                 | \$7,995-\$17,000 (1M byte)                |
| <i>Universe 68</i>   | 1983                 | Scientific/engineering   | DEC VAX-11/780                    | 1.25                | NA  | .5-5                        | NA                                | 20                              | NA             | Unix System V                                 | 64                      | 12                      | 32                 | \$14,950 (1M byte)                        |
| <i>Universe 32</i>   | 1985                 | Special purpose  | DEC VAX-11/780                    | 2.7                 | NA  | 1-16                        | 15                                | 20                              | 4-64           | Unix System V                                 | 64                      | 12                      | 32                 | \$23,200 (1M byte)                        |
| <b>CIE Systems, Inc.</b><br>2515 McCabe Way<br>Irvine, Calif. 92713<br><i>680/30-46</i>                                | 1984                 | Commercial DP  | NA                                | .7*                 | NA  | .512K-.768K                 | .625                              | NA                              | 4-8            | Pick, RM/COS, Regulus                         | 8                       | 6                       | 16                 | \$8,999                                   |
| <i>680/100, 150</i>  | 1984                 | Commercial DP  | NA                                | 1                   | NA  | .5-8                        | .625                              | NA                              | 4-32           | Pick, RM/COS, Regulus                         | 12-32                   | 8-18                    | 16                 | \$12,995 (\$19,995 (1M byte))             |
| <i>680/200, 250</i>  | 1984                 | Commercial DP  | NA                                | 1-3                 | NA  | 1-8                         | 2.46-2.5                          | NA                              | 8-64           | Pick, RM/COS, Regulus                         | 40-64                   | 25-40                   | 16                 | \$29,995-\$48,900                         |
| <b>Computer Console, Inc.</b><br>9801 Muirlands Blvd.<br>Irvine, Calif. 92718<br><i>Power 5/32</i>                     | 1985                 | Office/distributed processing  | DEC Microvax II                   | 1.25                | NA  | 2-4                         | NA                                | 1.3                             | 16             | Unix 4.2                                      | 28                      | 16                      | 16                 | \$20,900 (2M bytes)                       |
| <b>Compupro (formerly Vispro Corp.)</b><br>26538 Danit Court<br>Hayward, Calif. 94545<br><i>Compupro 10 Plus</i>       | 1983                 | Office/distributed processing  | NA                                | NA                  | NA  | 1                           | 5                                 | 2.5                             | 8              | Digital Research, Inc. Concurrent DOS         | 4                       | 4                       | 16                 | \$4,995 (1M byte)                         |
| <i>Compupro 286/40, 80</i>   | 1984                 | Office/distributed processing  | NA                                | NA                  | NA  | 1                           | 5                                 | 2.5                             | 9-17           | DOS   | 8-14                    | 4-14                    | 16                 | \$8,395-\$12,500 (768K bytes)             |
| <b>Computer Designed Systems, Inc.</b><br>10911 Olson Memorial Hwy.<br>Minneapolis, Minn. 55441<br><i>Adviser 25/4</i> | 1983                 | TP, office/distributed processing  | IBM System/36                     | NA                  | NA  | Up to 1                     | 14                                | NA                              | 8/16           | AVOS  | 8-16                    | 6-10                    | 32                 | \$3,400                                   |
| <b>Concurrent Computer Corp.</b><br>2 Crescent Place<br>Oceanport, N.J. 07757<br><i>3203, 3205</i>                     | 1983                 | Commercial DP, scientific/engineering, TP                                | DEC Microvax                      | NA                  | 400K  | .5-4                        | 1.2                               | 1.5                             | 1              | OS/32, XELOS (Unix System V)                  | 16                      | 8                       | 32                 | \$19,900 (.5M bytes) - \$20,100 (1M byte) |
| <i>3210</i>  | 1981                 | Commercial DP, scientific/engineering, TP, office/distributed processing | DEC Microvax, VAX 8200            | NA                  | 600K  | 1-16                        | 3                                 | 8                               | 4              | OS/32, XELOS (Unix System V)                  | 64                      | 32                      | 32                 | \$38,000 (1M byte)                        |
| <b>Convergent Technologies, Inc.</b><br>2314 N. First St.<br>San Jose, Calif. 95131<br><i>S/50</i>                     | NA                   | Office/distributed processing  | NA                                | .75                 | NA  | 1-2                         | .5                                | NA                              | 5              | CTIX-Unix                                     | 5                       | 3                       | 32                 | \$7,000 (1M byte)                         |
| <i>S/120, 220</i>  | June 1986            | Office/distributed processing  | DEC Microvax II                   | 1.9                 | 810K  | 1-5                         | .5-2.4                            | 12                              | 12-22          | CTIX-Unix                                     | 12-22                   | 10-16                   | 32                 | \$9,995-\$13,000                          |
| <b>Cromemco, Inc.</b><br>280 Bernardo Ave.<br>Mountain View, Calif. 94043<br><i>CS400</i>                              | 1985                 | Scientific/engineering, office/distributed processing                    | DEC Microvax II                   | 2-4                 | 250K  | 2-16                        | 5M bits                           | NA                              | 9              | AT&T Unix System V, Cromix-Plus               | 16                      | 8                       | 32/16              | \$19,690 (2M bytes)                       |



## Hardware Roundup/Small Systems

|  | Date First Installed | Primary Market   | Most Compatible DEC or IBM System        | Performance in MIPS | Performance (millions of instructions/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Maximum I/O Bandwidth (M bytes) | Ports/Channels | Operating System               | Maximum Number of Users | Typical Number of Users | Word Length (bits) | Base Price                                |
|--|----------------------|--|--|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------|--------------------------------|-------------------------|-------------------------|--------------------|---|
| <b>CS420</b>   | August 1986          | Scientific/engineering, office/distributed processing                    | DEC Microvax II                          | 3-8                 | NA  | 2-16                        | 5M bits                           | NA                              | 9              | Unix V.2, Cromix-Plus          | 65                      | 16                      | 32                 | \$27,995 (2M bytes)                       |
| <b>Data General Corp.</b><br>4400 Computer Drive<br>Westboro, Mass. 01580                                  | March 1986           | Commercial DP, office/distributed processing                             | DEC Microvax II                          | 1                   | 972   | 2-10                        | 5M bits                           | 8                               | 24             | AOS/VS, DG/UX, MV/UX, AOS/DVS  | 24                      | 4-20                    | 32                 | \$17,500 (2M bytes)                       |
| <b>Eclipse MV/2000 DC</b>  |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>Eclipse MV/7800</b>   | July 1986            | Commercial DP, scientific/engineering, office/distributed processing     | IBM 4361-5, DEC VAX 8200                 | 1.06                | 1,067K                                      | Up to 14                    | Up to 2.2                         | 10                              | 128            | AOS/VS, AOS, DVS, DG/UX (Unix) | 50                      | 28-50                   | 32                 | \$27,550 (4M bytes)                       |
| <b>Datapoint Corp.</b><br>9725 Datapoint Drive<br>San Antonio, Texas 78284                                 | 1983                 | TP, office/distributed processing  | IBM System/36, DEC PDP-11/73, VAX-11/725 | .3                  | NA  | 256K-1M                     | .5                                | 1.088                           | 24             | DOS/RMS (Proprietary)          | 24                      | 4-10                    | 8                  | \$12,995-\$17,495 (512K bytes)            |
| <b>8640/8645 system</b>  |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>8650/8652 system</b>  | 1985                 | Commercial DP, TP, office/distributed processing                         | IBM System/36, DEC 11/73, 11/725         | .3                  | NA  | 256K-1.024K                 | .5                                | 1.088                           | 24             | DOS/RMS                        | 24                      | 4-10                    | 8                  | \$13,995-\$18,495 (512K bytes)            |
| <b>Digital Equipment Corp.</b><br>146 Main St.<br>Maynard, Mass. 01754                                     | 1985                 | Commercial DP, scientific/engineering, office/distributed processing     | NA                                       | .9*                 | NA  | 2-5                         | NA                                | NA                              | NA             | MicroVMS, Ultrix               | 33                      | NA                      | 32                 | \$18,800 (2M bytes) - \$42,500 (5M bytes) |
| <b>Microvax II</b>   |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>VAX 8200</b>  | February 1986        | Commercial DP, scientific/engineering, TP, office/distributed processing | IBM 4361-4                               | 1*                  | NA  | 4-24                        | 1                                 | 13.3                            | NA             | VMS, Ultrix-32                 | NA                      | 16-64                   | 32                 | \$79,000 (8M bytes)                       |
| <b>Dual Systems Corp.</b><br>2530 San Pablo Ave.<br>Berkeley, Calif. 94702                                 | 1983                 | Commercial DP, scientific/engineering                                    | DEC Microvax I                           | 2                   | NA  | Up to 6                     | 560K-800K                         | 10                              | 4              | AT&T Unix System V             | 16                      | 4-8                     | 16                 | \$19,990 (512K bytes)                     |
| <b>83/80</b>   |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>Chaparral III, IV</b>   | 1986                 | Commercial DP, scientific/engineering, office/distributed processing     | DEC Microvax II                          | 4                   | NA  | 1-17                        | 870K-880K                         | 40                              | 8              | Unix System V                  | 32                      | 8                       | 32                 | \$22,900-\$28,000 (1M byte)               |
| <b>83/500</b>  | 1984                 | Commercial DP, scientific/engineering                                    | DEC Microvax I                           | 2                   | NA  | 2-6                         | 560K-800K                         | 10                              | 8              | Unix System V                  | 16                      | 4-8                     | 16                 | \$51,610 (2M bytes)                       |
| <b>Fortune Systems Corp.</b><br>300 Harbor Blvd.<br>Belmont, Calif. 94002                                  | 1982                 | Commercial DP, scientific/engineering, TP, office/distributed processing | DEC Microvax, IBM System/36 PC           | .36                 | NA  | 3.5                         | 12M bits                          | 30M bits                        | 25             | AT&T Unix System V, FOR:PRO    | 24                      | 5-16                    | 32/16              | \$6,995 (512K bytes) - \$14,995 (1M byte) |
| <b>Fortune 32:16 series</b>  |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>General Automation, Inc.</b><br>1045 S. East St.<br>Anaheim, Calif. 92805                               | March 1986           | Special purpose, manufacturing automation                                | IBM System/36, DEC PDP-11                | NA                  | NA  | 512K                        | 625K                              | 5                               | 7              | Pick/Zebra                     | 6                       | 4                       | 16/32              | \$8,300 (512K bytes)                      |
| <b>Zebra 1350</b>  |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>Zebra 1750</b>  | 1984                 | Special purpose, manufacturing automation                                | IBM System/36                            | NA                  | NA  | Up to 1                     | 625K                              | 5                               | 19             | Pick/Zebra                     | 18                      | 10                      | 16/32              | \$19,900 (512K bytes)                     |
| <b>Harris Corp. Computer Systems Division</b><br>2101 W. Cypress Creek Road<br>Fort Lauderdale, Fla. 33309 | 1st quarter 1986     | Scientific/engineering   | DEC Microvax II                          | .3-14               | 3.6-6.8                                     | 10-16                       | 625K                              | 6-12                            | 4-12           | HS/UX                          | 12-32                   | 1-20                    | 32                 | \$18,725-\$32,400                         |
| <b>Harris MCX-3, Models 40, 60</b>   |                      |  |  |                     |   |                             |                                   |                                 |                |                                |                         |                         |                    |   |
| <b>MCX-5, Model 60</b>   | 1st quarter 1986     | Scientific/engineering   | DEC VAX 8200                             | 14                  | 6.8   | 16                          | 1.86                              | 12                              | Up to 12       | HS/UX                          | 32                      | 6-20                    | 32                 | \$37,800                                  |







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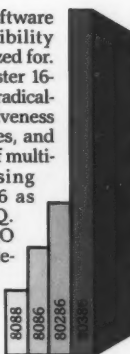
velopment of powerful new business programs, more advanced engineering software, and artificial intelligence applications.

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## Hardware Roundup/Small Systems

|  | Date First Installed | Primary Market   | Most Comparable DEC or IBM System         | Performance in MIPS | Performance (millions of instructions/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Maximum I/O Bandwidth (M bytes) | Ports/Channels | Operating System                          | Maximum Number of Users | Typical Number of Users | Word Length (bits) | Base Price   |
|--|----------------------|--|---|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------|---|-------------------------|-------------------------|--------------------|--|
| <b>Masscomp Co.</b><br>One Technology Park<br>Westford, Mass. 01886<br><br><i>MC5000 series</i><br>(single and multiprocessor)     | 1985                 | Scientific/<br>engineering                             | DEC VAX, 8200                             | 1.6-5               | 650K-<br>12M                                | 2-32                        | .625-2.4                          | 6-<br>26.6                      | 3-20           | Unix 4.2, AT&T Unix<br>System V, RTV, RTU | 4-64                    | 2-32                    | 32                 | \$14,000<br>(2M bytes) -<br>\$69,250<br>(4M bytes) |
| <b>McDonnell Douglas<br/>Computer Systems Co.</b><br>4000 W. MacArthur Blvd.<br>Newport Beach, Calif.<br>92660<br><br><i>M6000</i> | 1985                 | Commercial<br>DP                                       | IBM System/36,<br>DEC PDP-11              | NA                  | NA  | 512K-<br>2M                 | NA                                | NA                              | 8-64           | Reality                                   | 64                      | 8-16                    | 16                 | \$26,500<br>(512K bytes)                           |
| <b>MDS Quantel, Inc.</b><br>4142 Point Eden Way<br>Hayward, Calif. 94545<br><br><i>System 45</i>                                   | Feb.<br>1986         | TP   | IBM System/36                             | NA                  | NA  | 256K-<br>1M                 | NA                                | NA                              | 8              | BEST/AOS<br>(Proprietary)                 | 32                      | 8-10                    | 8                  | \$7,950<br>(256K bytes)                            |
| <i>System 55</i>   | Feb.<br>1986         | TP   | IBM System/36                             | NA                  | NA  | 512K-<br>4M                 | NA                                | NA                              | 8              | BEST/AOS                                  | 64                      | 20                      | 8                  | \$12,950<br>(512K bytes)                           |
| <i>System 58</i>   | Feb.<br>1986         | TP   | IBM System/36                             | NA                  | NA  | 1-16                        | NA                                | NA                              | 14             | BEST/AOS                                  | 64                      | 20                      | 8                  | \$24,950<br>(1M byte)                              |
| <b>Modular Computer<br/>Systems, Inc.</b><br>1650 W. McNab Rd.<br>Fort Lauderdale, Fla.<br>33310<br><br><i>Classic II/15</i>       | 1984                 | Scientific/<br>engineering                             | NA  | .2                  | NA  | 2                           | NA                                | NA                              | 16             | MAX IV (Proprietary)                      | 16-32                   | NA                      | 16                 | \$13,500<br>(512K bytes)                           |
| <i>Classic II/25</i>   | 1982                 | Scientific/<br>engineering                             | NA  | .3                  | NA  | 1                           | NA                                | NA                              | 16             | MAX IV                                    | 64                      | NA                      | 16                 | \$23,200<br>(256K bytes)                           |
| <i>Classic II/45</i>   | 1982                 | Scientific/<br>engineering                             | NA  | .7                  | NA  | 1                           | NA                                | NA                              | 16-48          | MAX IV                                    | 128                     | NA                      | 16                 | \$40,000<br>(1M bytes)                             |
| <b>Motorola Computer<br/>Systems, Inc.</b><br>10700 N. DeAnza Blvd.<br>Cupertino, Calif. 95014<br><br><i>Vision/32</i>             | Sept.<br>1986        | TP   | IBM System/36,<br>DEC Microvax II         | 2                   | NA  | 2-8                         | Up to 5                           | 7                               | Up to<br>18    | Unix System V/68                          | 8                       | 8                       | 32                 | \$11,200<br>(2M bytes)                             |
| <i>System 8000 series</i>  | Sept.<br>1985        | Office/dis-<br>tributed pro-<br>cessing                | IBM System/36,<br>DEC Microvax II         | 2                   | NA  | 2-16                        | Up to 250K                        | 7                               | 18-34          | Unix System V/68                          | 8-32                    | 8-24                    | 32                 | \$9,200-<br>\$12,175<br>(2M bytes)                 |
| <b>NCR Corp.</b><br>1700 S. Patterson Blvd.<br>USG-3<br>Dayton, Ohio 45479<br><br><i>NCR Minitor</i><br>(3450-XXXX)                | 1985                 | Commercial<br>DP, office/<br>distributed<br>processing | IBM System/36<br>5364                     | .5                  | NA  | 1-2                         | 5M bits                           | 5M<br>bits                      | 8              | Unix System 5.2                           | 8                       | 4                       | 16                 | \$9,450<br>(1M byte)                               |
| <i>NCR Tower XP</i><br>(3400-XXX)  | 1984                 | Commercial<br>DP, office/<br>distributed<br>processing | DEC Microvax II,<br>IBM System/36<br>5362 | .8                  | NA  | 1-8                         | 5M bits                           | 5M<br>bits                      | 16             | Unix System 5.2                           | 16                      | 12                      | 16                 | \$12,670<br>(1M byte)                              |
| <i>NCR Tower 32/600</i><br>(3460-XXXX)   | 1985                 | Commercial<br>DP, office/<br>distributed<br>processing | Microvax II, IBM<br>System/36 5362        | 2.1                 | 3.33  | 1-16                        | 5M bits                           | 5M<br>bits                      | 48             | Unix System 5.2                           | 48                      | 24                      | 32                 | \$22,170<br>(1M byte)                              |
| <b>NEC Information<br/>Systems, Inc.</b><br>1414 Massachusetts Ave.<br>Boxboro, Mass. 01719<br><br><i>Astra XL/32</i>              | NA                   | Commercial<br>DP, office/<br>distributed<br>processing | DEC Microvax II                           | NA                  | NA  | 1-16                        | 1.2                               | NA                              | 32             | AT&T Unix System V                        | 32                      | 24                      | 32                 | \$16,995<br>(1M byte)                              |
| <b>Nixdorf Computer<br/>Corp.</b><br>300 Third Ave.<br>Waltham, Mass. 02154<br><br><i>8850 M5</i>                                  | 1985                 | Special pur-<br>pose, de-<br>partmental<br>processing  | IBM System/36                             | .20                 | NA  | 128K                        | NA                                | NA                              | 4              | DPEX V.2<br>(Proprietary)                 | 4                       | 4                       | 16                 | \$10,000   |
| <i>8850 M35, M45</i>   | 1984                 | Special pur-<br>pose, de-<br>partmental<br>processing  | IBM System/36                             | .20                 | NA  | 128K                        | NA                                | NA                              | 9-16           | DPEX V.2                                  | 9-16                    | 9                       | 16                 | \$12,000-<br>\$22,000                              |
| <i>8850 M55, M65</i>   | 1984                 | Special pur-<br>pose, de-<br>partmental<br>processing  | IBM System/36                             | .20                 | NA  | 128K                        | NA                                | NA                              | 32             | DPEX V.2                                  | 32                      | 22                      | 16                 | \$28,500-<br>\$32,000                              |
| <i>8855 M10</i>  | July<br>1986         | Commercial<br>DP                                       | IBM System/36                             | .5                  | NA  | 8                           | NA                                | NA                              | 48             | DPEX C (Proprietary)                      | 48                      | 48                      | 32                 | \$33,000   |



## Hardware Roundup/Small Systems

|   | Date First Installed | Primary Market   | Most Compatible DEC or IBM System       | Performance in MIPS | Performance (millions of Whetstones/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Minimum I/O Bandwidth (M bytes) | Ports/Channels | Operating System                     | Minimum Number of Users | Typical Number of Users | Word Length (bits) | Base Price                                  |
|---|----------------------|--|---|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------|--------------------------------------|-------------------------|-------------------------|--------------------|---|
| <b>Norsk Data N.A., Inc.</b><br>Suite 150<br>1800 W. Park Drive<br>Westboro, Mass. 01581<br><br>ND 110 Satellite,<br>110 Compact,<br>110 Compact CX | 1986                 | Office/distributed processing  | DEC Microvax, DEC VAX-11/730            | .32-.55             | NA  | 1-16                        | 1.2                               | 4                               | 1              | Sintran III (Proprietary)            | 9-48                    | NA                      | 16                 | \$20,000-\$33,600 (1M byte)                 |
| <b>Onyx Technologies, Inc.</b><br>47354 Fremont Blvd.<br>Fremont, Calif. 94538<br><br>C5010, C5012 series   | 1980                 | Office/distributed processing  | NA                                      | NA                  | NA  | 384K-1,024K                 | 1.5                               | NA                              | 5-11           | Oasis/Theos, Unix System III         | 7-11                    | 3-8                     | 8, 16              | \$5,995 (384K bytes) - \$9,995 (512K bytes) |
| <b>Plexus Computers, Inc.</b><br>3833 N. First St.<br>San Jose, Calif. 95134<br><br>P/15, P/20  | 1985                 | Commercial DP  | DEC Microvax II                         | 1                   | NA  | 1-2                         | .625                              | 1.5                             | 8-16           | Unix System 5.2                      | 8-16                    | 8-16                    | 16                 | \$10,450-\$12,450 (1M byte)                 |
| <b>Point 4 Data Corp.</b><br>15442 Del Amo Ave.<br>Tustin, Calif. 92680<br><br>Point 4 Mark 2, Mark 3   | 1981                 | Commercial DP  | IBM PC AT, DEC PDP-11/23                | 1.7                 | NA  | 64K-128K                    | .625-1.25                         | 3.3                             | 7              | Iris                                 | 7                       | 4-7                     | 16                 | \$6,500-\$8,995 (64K bytes)                 |
| <b>Point 4 Mark 5</b>   | 1979                 | Commercial DP  | IBM System/36, DEC Microvax II          | 2.5                 | NA  | 64K-128K                    | 1.2                               | 5                               | 32             | Iris                                 | 32                      | 32                      | 16                 | \$8,750 (128K bytes)                        |
| <b>Point 4 Mark 9</b>   | 1984                 | Commercial DP  | NA                                      | 3.3                 | NA  | 512K                        | 1.2                               | 6.15                            | 64             | Iris                                 | 64                      | 40                      | 16                 | \$12,870 (512K bytes)                       |
| <b>Point 4 Mark 4</b>   | 1985                 | Commercial DP  | NA                                      | 3.5                 | NA  | 512K                        | .625                              | 833                             | 17             | Iris                                 | 16                      | 16                      | 16                 | \$21,995 (512K bytes)                       |
| <b>Prime Computer, Inc.</b><br>Prime Park<br>Natick, Mass. 01760<br><br>2350  | 1986                 | Commercial DP, scientific/engineering, TP, office/distributed processing | DEC Microvax II                         | .85                 | NA  | 2-8                         | .63                               | 5                               | 20             | Primos                               | 16                      | NA                      | 32                 | \$36,900 (4M bytes)                         |
| <b>2450</b>   | 1986                 | Commercial DP, scientific/engineering, TP, office/distributed processing | DEC Microvax II                         | 1.3                 | NA  | 2-8                         | .63                               | 5                               | 28             | Primos                               | 24                      | NA                      | 32                 | \$53,900 (4M bytes)                         |
| <b>2655</b>   | NA                   | Commercial DP, scientific/engineering, TP, office/distributed processing | DEC VAX 8200                            | 1.3                 | NA  | 4-8                         | 1.2                               | 5                               | 68             | Primos                               | 64                      | NA                      | 32                 | \$99,200 (4M bytes)                         |
| <b>Rexon Business Machines Corp.</b><br>5800 Uplander Way<br>Culver City, Calif. 90230<br><br>RX55, RX105, RX205                                    | 1984                 | Commercial DP  | IBM System/36                           | NA                  | NA  | .5-4                        | 5M bits                           | NA                              | 16             | Microsoft Xenix, Recap (Proprietary) | 16                      | 12                      | 16                 | \$9,990 (512K bytes)                        |
| <b>RX405</b>  | Nov. 1986            | Commercial DP  | IBM System/36                           | NA                  | NA  | .5-4                        | 9.68M bits                        | NA                              | 32             | Xenix, Recap                         | 32                      | 24                      | 16                 | \$23,990 (512K bytes)                       |
| <b>Rexon TX series</b>  | Sept. 1986           | Commercial DP  | IBM System/36                           | NA                  | NA  | 1-4                         | 5M bits                           | NA                              | 16             | Xenix                                | 16                      | 12                      | 16                 | \$13,270-\$26,490 (1M byte)                 |
| <b>Sperry Corp.</b><br>P.O. Box 500<br>Blue Bell, Pa. 19424<br><br>Series 5000, Models 20, 40   | 1984                 | Office/distributed processing  | IBM RT PC, System/36; DEC VAX, Microvax | .7-.98*             | NA  | 1-8                         | 5M bits                           | 10 MHz                          | 9-18           | AT&T Unix System V                   | 8-16                    | 8-16                    | 16                 | \$13,925-\$16,075 (1M byte)                 |
| <b>Series 5000, Model 50</b>  | April 1986           | Office/distributed processing  | IBM RT PC, System/36; DEC VAX, Microvax | 2.2*                | NA  | 2-16                        | 5M bits                           | 16.67 MHz                       | 36             | Unix System V                        | 32                      | 32                      | 32                 | \$23,030 (2M bytes)                         |
| <b>Series 5000, Model 60</b>  | 1984                 | Office/distributed processing  | IBM RT PC, System/36; DEC VAX, Microvax | .98-1.7*            | NA  | 2-16                        | 5M bits                           | 12.5 MHz                        | 36             | Unix System V                        | 32                      | 32                      | 32                 | \$54,000 (2M bytes)                         |
| <b>Series 5000, Models 80, 90</b>   | 1984                 | Office/distributed processing  | IBM RT PC, System/36; DEC VAX, Microvax | .98-6.3*            | NA  | 2-16                        | 5M bits                           | 12.5 MHz                        | 99/3           | Unix System V                        | 88                      | 88                      | 32                 | \$67,800 (2M bytes) - \$68,300 (4M bytes)   |



|   | Date First Installed | Primary Market                                   | Most Compatible DEC or IBM System    | Performance in MIPS | Performance (millions of instructions/sec.) | Main Memory Range (M bytes) | Disk Transfer Rate (M bytes/sec.) | Maximum I/O Bandwidth (M bytes) | Ports/Channels | Operating System                  | Maximum Number of Users | Typical Number of Users | Word Length (bits) | Base Price                   |
|---|----------------------|--|--------------------------------------|---------------------|---|-----------------------------|-----------------------------------|---------------------------------|----------------|-----------------------------------|-------------------------|-------------------------|--------------------|------------------------------|
| <b>Tandem Computers, Inc.</b><br>19333 Valco Pkwy.<br>Cupertino, Calif. 95014<br><br>Nonstop EXT10                    | Third-quarter 1986   | Commercial DP, TP, office/distributed processing | NA                                   | 4.3-8.6*            | NA  | 8-32                        | 1.8                               | 5                               | 2-4            | GUARDIAN 90 (Proprietary)         | 150                     | 150                     | 16                 | \$82,500 (8M bytes)          |
| <b>Texas Instruments, Inc.</b><br>P.O. Box 809063<br>Dallas, Texas 75380<br><br>Business System 300 series (300/300A) | 1982                 | Commercial DP                                    | IBM System/36                        | .45*                | NA  | 512K- 3.2 1.75M             |                                   | 3                               | 1              | DX10, DNOS                        | 7                       | NA                      | 16                 | \$9,995-\$27,995             |
| <b>Business System 600, 800 series</b>  | 1982                 | Commercial DP                                    | IBM System/36, System/38             | .45-.75*            | NA  | 512K- 3 2M                  |                                   | 3                               | 10             | DX10, DNOS                        | 16-40                   | NA                      | 16                 | \$22,995-\$67,550            |
| <b>The Ultimate Corp.</b><br>717 Ridgedale Ave.<br>East Hanover, N.J. 07936<br><br>1500 series                        | 1984                 | Commercial DP                                    | IBM System/36                        | NA                  | NA  | 256K- .5 2M                 |                                   | 1                               | 8-16           | Proprietary                       | 8-32                    | 6-24                    | 16                 | \$19,000-\$42,000            |
| <b>2020</b>   | 1985                 | Commercial DP                                    | IBM System/36                        | NA                  | NA  | 1 1.04                      |                                   | 1                               | 8              | Proprietary                       | 32                      | 8                       | 16                 | \$52,000                     |
| <b>3000 series</b>  | 1985                 | Commercial DP                                    | NA                                   | NA                  | NA  | 512K- 4M                    | 1.21                              | 1                               | 8-16           | Proprietary                       | 32-64                   | 16-48                   | 16                 | \$43,000-\$81,000            |
| <b>Wang Laboratories, Inc.</b><br>One Industrial Ave.<br>Lowell, Mass. 01851<br><br>VS 5                              | April 1986           | Commercial DP, office/distributed processing     | IBM System/36 5362, DEC Micro-vax II | .4*                 | NA  | 1-2 1.2                     |                                   | NA                              | NA             | VS/OS (Proprietary)               | 8                       | 6-8                     | 32                 | \$12,000 (1M byte)           |
| <b>VS 6</b>   | April 1986           | Commercial DP, office/distributed processing     | IBM System/36 5360, DEC Micro-vax II | .7*                 | NA  | 1-4 1.2                     |                                   | NA                              | NA             | VS/OS                             | 16                      | 10-14                   | 32                 | \$19,950 (1M byte)           |
| <b>VS 65</b>  | 1985                 | Commercial DP, office/distributed processing     | IBM System/36, 8200                  | .7*                 | NA  | 1-4 1.2                     |                                   | NA                              | 6              | VS/OS                             | 40                      | 25-40                   | 32                 | \$19,950 (1M byte)           |
| <b>Wicat Systems, Inc.</b><br>1875 S. State St.<br>Drem, Utah 84058<br><br>System 1250, 1255                          | 1985                 | Commercial DP                                    | NA                                   | 1.25                | NA  | 1-7 5M-8M bits              |                                   | NA                              | 8-24           | Pick, Unipius, WMCS (Proprietary) | 16-24                   | 8-16                    | 16                 | \$7,750-\$10,020 (1M byte)   |
| <b>System 1260, 2220</b>  | 1984                 | Commercial DP                                    | NA                                   | 1.25                | NA  | 1-12 16M bits               |                                   | NA                              | 8-64           | Pick, Unipius, WMCS               | 32-64                   | 24-32                   | 16                 | \$13,285-\$19,000            |
| <b>Zilog, Inc.</b><br>1315 Dell Ave.<br>Campbell, Calif. 95008<br><br>System 8000/32 Models 110, 130                  | April 1986           | TP, office/distributed processing                | NA                                   | 4                   | 1-3   | 2-16 .5-4                   |                                   | 8                               | 10-58          | AT&T Unix System V                | 26-58                   | NA                      | 32                 | \$22,900-\$37,900 (2M bytes) |



## In Depth

# Managing the risks of installing CIM

By WILLIAM KIMMERLY

*If a CIM project backfires, you may be worse off than when you started*

- Avoiding 'excessive' software integration
- Partition tactic: divide and conquer

**T**he decision to implement a comprehensive computer-integrated manufacturing (CIM) program places an organization in a position of significant risk. During the program's implementation, an organization will undergo a fundamental transformation that will affect not only its key manufacturing processes but quite likely the structure of the organization and the perspectives, attitudes and job assignments of employees as well.

If this process of transformation is not managed well, particularly with respect to risk management, the expected level of integration will not be achieved, leaving the organization in a vulnerable position. Not only will the organization have disrupted the manufacturing equilibrium that existed prior to the program's implementation, but it also will have invested perhaps millions of dollars and be in an even worse competitive position than before.

CIM describes a comprehensive form of factory automation that involves substantial integration of an organization's key manufacturing processes and related support functions through the use of computers, electronic data bases and telecommunications facilities.

There are few examples of successful fully integrated manufacturing organizations to date. However, progress in integrating and automating specific manufacturing functions, coupled with increasing competitive pressures, have caused many managers to adopt CIM as their primary strategy for the future of their organizations.

## Approaches

There are a number of common sense approaches that senior-level managers can take to manage CIM implementation risks:

- Effectively partitioning the implementation program.
- Management insistence on simple, straightforward solutions.
- Avoiding excessive software integration.
- Maintaining a policy of buying proven solutions whenever possible.
- Encouraging reasonable schedules.
- Providing adequate and timely attention to personnel needs.
- Carrying out integration-readiness reviews on a systematic basis.
- Ensuring the existence of an effective information resource management program.
- Maintaining realistic expectations based on appropriate control measures.

This article will discuss some of the major areas of risk that must be managed in a



large-scale CIM implementation effort. The focus is not on formal risk analysis methods but on common sense approaches that managers can easily adopt.

The discussion assumes that before a CIM program is formally launched, certain fundamental risk reduction actions, such as securing top management support for the programs, will be addressed. Moreover, top management will have evaluated the position of the organization with respect to the imperatives of its present and projected corporate environments and will have formulated broad implementation strategies, including timing estimates for major phases of the program.

Finally, it should be noted that most CIM programs will evolve more or less continuously. Thus, the term "program" represents a collection of CIM strategies and objectives that apply to a particular period of time; these will change as conditions change.

## Manufacturing as an open system

The implementation of a comprehensive CIM program presents certain fundamental management challenges that transcend those associated with the program's technical complexity. To better understand the nature of these challenges, it is helpful to view a manufacturing organization as an open system.

A simplified definition of a system is a collection of elements (functions, objects, people and so on) that are related both one to another and to the unifying purpose that provides the basis for the bonding among

## About the author

Kimmerly is senior computer consultant at Martin Marietta Energy Systems, Inc. in Oak Ridge, Tenn.



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## In Depth/Managing CIM Risks

system elements. If this bonding is tight, as in an integrated system, the system can be said to have high coherence; if the bonding is relatively loose, the system has low coherence.

The purpose of a CIM program is to change a manufacturing organization from a condition of relatively low coherence to one of relatively high coherence. This change can be brought about by strengthening or modifying relationships among existing elements; adding elements such as new technologies; modifying the unifying purpose by revising mission statements, strategies, charters and policies; or some combination.

## Ripple effect

A manufacturing organization is an open system in that many of its key elements are subject to influences from conditions or events outside the system such as changes in technology, shifting markets and increasing competition. As each element of an open system is affected by an outside influence, the entire system can be affected through a series of cause-and-event relationships that ripple throughout the system. As the degree of coherence among elements increases, the potential impact of a change to a single key element also increases.

The importance of this to the management of a CIM implementation program is that as elements are modified to move the system toward increased coherence, or integration, senior management's attention must remain on the behavior of the system as a whole. The evolving CIM program will be too rich in element interdependencies and technological complexities for the management implementation team to concentrate on individual areas of detail for long.

Because the focus of management attention must remain at a macroscopic level, policies and standards need to be in place — and enforced. These can provide a decision framework for problems and issues that relate to implementation details. The exact nature of this decision framework will depend upon an organization's mission and the relevant characteristics of both its present and future environments. These factors will suggest a set of critical success factors and other forms of decision criteria that can be used for guidance in making operational decisions.

For example, senior management can establish in advance the relative priority of targeted CIM benefit areas. This exercise provides a basis for separating the CIM program into manageable partitions, and it immediately identifies CIM priorities. Conflicts over priorities can be a troublesome, contentious area that can impede progress throughout the life cycle of the program and, as a result, increase the risk of program failure. Effective preplanning and delineation of objectives, priorities and other basic decision criteria can reduce this risk.

## Diversification through partitioning

An established method for managing risk is to attempt to average the risk of loss through diversification. In a CIM program, diversification can be achieved by separating the program into manageable partitions, each of which is designed to deliver certain benefits even if the planned level of integration is never achieved.

Looking only at the two extremes

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*A manufacturing organization is an open system in that many of its key elements are subject to influences from conditions or events outside the system. As each element is affected by an outside influence, the entire system can be affected. As the degree of coherence among elements increases, the potential impact of a change in the status of a single key element also increases.*

of a spectrum of possible approaches, a CIM program can be designed and implemented in one of two ways. First, the program can be viewed as a totally integrated concept throughout its life cycle, with all of its key elements being designed for integra-

tion in a more or less comprehensive parallel effort.

Second, the program can be viewed as a series of individual project steps that are implemented serially. Each individual partition of the program is designed, tested and im-

plemented before the next partition is addressed.

The parallel approach offers the highest potential payoff because of its emphasis on synergy and maximum efficiency in the interconnections among systems elements, as well as its objective of minimizing the time required to achieve integrated operations. This approach also exhibits a high degree of risk because it represents a much more substantial shock to an open system in a steady-state condition. It is also a more complex undertaking and depends on extensive integration before benefits can be realized.

The serial approach offers a lower potential payoff because it sacrifices synergy and efficiency in order to reduce risks. Carried to an extreme, however, a slow, piecemeal approach can be as risky as the parallel

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| • Service today in over 50 cities   | YES            | NO         |
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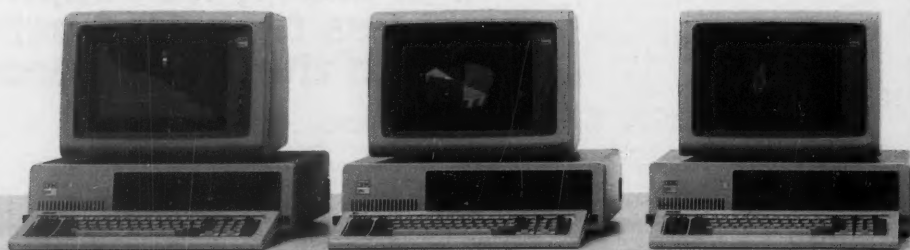
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## In Depth/Managing CIM Risks

## Are you in trouble?

By WILLIAM BRACKER

Computer-integrated manufacturing (CIM) evokes various reactions among companies. Most likely, no major manufacturing firm lacks some kind of CIM program, if only because companies realize that issues of productivity, quality and competitive edge force them to take a close look at how they are doing business. The danger comes from assuming that some new technology, such as CIM, will remedy all ills.

There are various warning signs within a company's approach to CIM signaling attitudes that can hinder successful implementation and integration of CIM:

- Lack of a strategic plan. Without a plan, CIM will at best be delayed and at worst be doomed. CIM is both a methodology and a philosophy. The simple application of technology alone will not form a cohesive and usable CIM system.
- The technology bomb. The error here lies in applying technology to fight fires within an organization and calling the result CIM.

*Bracker is director of research at Technology Research Associates in Tucson, Ariz., consultants in computer graphics, computer-integrated manufacturing and data communications.*

• Ignoring short-term goals and issues. Is your management more concerned with making quota than it is with your CIM projects? Can you guess why? Ask yourself what management is absorbed with in the short term. Determine how this new technology will make life easier for management. How will it affect next quarter's financial statements?

• Paper kill. Constant meetings and formation of CIM committees and teams with varying participants may mean your CIM project is being committed to death. The first meeting usually gets a big turnout; things go downhill from there. Have you been meeting for more than six months with no concrete results? Have you generated lots of memos, reports and charts but no project?

• Calling out the consultants. "We obviously do not have the in-house expertise to do all of this. Let's hire an expensive consultant to 'do CIM' for us." The corollary to this is: "Our people don't know anything. Why listen to them?" The usual result of calling out a consultant is paper kill.

• Try to buy. "Let's buy this thing and plug it in." When was the last time you saw an advertisement for an integrated CIM system? They do not exist. Off-the-shelf solutions might work for Manufacturing Resource Planning, but it will not

work for CIM.

• Wait for standards. "We really cannot do anything until the factory and networking standards stabilize, so we had better wait." When was the last time a standard solved your factory's problem?

• Claims of no support. "If we only had management support. . . ." You most likely have it already. It is called: Do what it takes to make this a profitable company.

• The select few. In this approach, management omits everyone from CIM planning except for a few people. Heaven forbid if the eventual users of the system get a say in its design.

• Always the future. "Hey, it's the factory of the future. Why work on it today?"

• Cash poor. "The lack of funding is killing us." So make do. Why not try developing a prototype project with existing hardware, software and people. Select an area that already has some identified inefficiencies. Your management cannot help but take notice if a short-term pain has been cured.

• Paperless is people-less. You need to figure on people being around for a long while — your planning better include a lot of personnel issues.

• A beginning and an end. "Once we start CIM, we can schedule its completion." CIM is a never-ending story.

When was the last time a standard solved your factory's problem?

approach because the program can take so long that it places the organization in a vulnerable competitive position competitively.

Neither of these two extremes should be followed unless there are compelling reasons to do so. A better approach is to define the CIM implementation program in terms of manageable partitions and then implement logical clusters of partitions in a time-phased approach.

Each partition should be designed to produce benefits irrespective of other partitions and at the same time should easily accommodate integration with other partitions when integration is determined to be feasible. Thus, benefits would be realized when a partition is implemented, and when the partition is integrated with other partitions, a new class of benefits would be realized.

This approach results in what might be called bounded integration, the integration of protected clusters of partitions, as opposed to unbounded integration, the integration of broad, sweeping collections of individual elements. From a risk management perspective, this concept is similar in principle to the use of watertight bulkheads in the construction of ships to prevent the spread of fire or leaks.

The separation of the CIM program into partitions and the implementation of logical clusters of partitions in a time-phased strategy does not represent a piecemeal approach. Depending upon the environment and the availability of resources, a substantial number of partitions

might be developed in parallel. The phased aspect of the partitioned approach is operating properly, producing at least some verifiable benefits and providing a reasonable prospect for integration before it is linked to other partitions.

Granted, this approach takes more time in the near term and might require the use of interim bridges, streams of test data and other temporary measures, but it does reduce risks. Once again, implementation managers have to determine the degree of risk they are willing to accept. If they cannot afford the risk of the full-scale parallel approach, partitioning with verification is an effective way to reduce risks.

## Selecting partitions

In selecting partitions for implementation, two important considerations should be made. First, an early, successful demonstration of the implementation's true value, ideally across departments, can be extremely valuable in obtaining support for the program.

If CIM benefits are perceived to be extremely long-term in nature, the program will be difficult for most organization members to relate to.

Second, it will be advantageous if a logical cluster of partitions can be implemented to produce a recognizable cycle of benefits. That is, the program will be much easier to understand and support if a related set of processes that span organizations and functions can be integrated. For example, the integration of such functions as product design, materials

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## In Depth/Managing CIM Risks

requirements planning and production scheduling and control could represent a recognizable benefit cycle in many organizations.

By integrating relatively small clusters of related partitions, not only are immediate benefits evident, but the potential benefits of further integration can also be made apparent.

Three basic criteria can be used to define program partitions. The first is to define a partition in terms of a specific category of benefits to be realized. For example, one category of benefits might relate to improved accuracy, flexibility and timeliness in distributing and retrieving engineering drawings, parts lists, production schedules and other documents vital to the manufacturing process. This partition can be developed and implemented to provide

these benefits even if little else is done. However, more substantial benefits will be realized when the partition becomes an integral part of the functioning of other partitions.

A second basis for defining a partition is in terms of a specific function. For example, the design engineering function might represent an area of relatively high strategic importance for a particular organization. The organization might be able to improve this function through introducing or refining existing computer-aided design and engineering (CAD/CAE) technologies and procedures. Within an overall framework of basic standards necessary for long-term integration, improvements in the CAD/CAE function can be pursued as an individual program partition.

A third way to define a partition

is in terms of a specific area of technology. For example, the success of any CIM program will depend ultimately on the existence of an effective system of telecommunications networks. At the same time, however, effective telecommunications resources are important even if integration in the CIM sense is never achieved. Therefore, telecommunications might represent a technology-based program partition that can serve as a focus of implementation.

### Keep things simple

As each partition of the CIM program is put into place, developers and implementation personnel face a range of design considerations. For example, the information systems that play the important role in a CIM environment can usually be designed to be integrated in a relatively sim-

ple and direct manner. However, such a design often occurs at the expense of perceived technological elegance and perhaps even some compromise in individual system — but not overall program — performance.

On the other hand, information systems can be integrated in ingenious ways, the systems' level of sophistication limited only by the technical creativity of their designers. However, while these solutions tend to obtain the maximum level of individual system performance, they often do so at the expense of adding overall program complexity. When this happens, optimized local performance — for example, within a partition — can be more than offset by added overall complexity and future integration difficulties.

Therefore, from a risk management perspective, choose the simple and straightforward solution over the complex, even if it means some degree of sacrifice in technical elegance and individual system performance. Similarly, the fewer technological options (for example, computer architectures) there are to deal with, the easier the integration process is likely to be. The objective is to keep the range of options limited to the set that will get the job done.

The inherent difficulty in achieving a working level of integration among elements in a complex open system makes the introduction of avoidable complexity something to be carefully guarded against. Management should make it immediately clear that a key consideration in all major decisions affecting the CIM program is the potential effect that decision may have on the program's level of complexity.

### Excessive software integration

One of the major objectives of a CIM program is to improve manufacturing flexibility. The goal is to be able to work toward achieving economies of scope — the range of tasks or functions a production facility can perform — rather than economies of scale — obtaining the highest level of output from a fixed production base.

Computer software is one of the keys to achieving this objective. But there can be a troublesome irony in this regard: While computer software can lead to increased manufacturing flexibility, given a particular set of requirements, it can also be integrated and implemented in a way that restricts long-term flexibility for the program as a whole.

This happens when the software elements of the CIM system become so thoroughly integrated that changing any part of the system is difficult without affecting the system as a whole. Thus, when a set of requirements evolves, caused perhaps by fundamental shifts in markets and product lines, the organization might find that it is unable to respond quickly because the integrated software systems do not lend themselves to change. The potential need to "unintegrate" and redesign parts of the CIM program was not recognized as an area of risk.

The best way to manage this risk is to encourage software integration in those application areas that appear to be relatively uncomplicated and enduring. Applications typically falling into this category are transaction processing, data collection

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and communications functions.

For those areas in which especially complex applications exist or that might be a function of a contemporary set of requirements likely to change over time, partitioning and isolation are once again the keys to risk management and long-term flexibility. Such areas should be identified as having a high-risk potential and should be linked to the rest of the CIM software environment in the form of separable modules.

**Buy rather than make**

As a general rule, risks can be reduced through the use of the tried and proved rather than the new and unproved. Perhaps surprisingly, this basic truth is often ignored in practice, particularly in areas of intensive activity involving the implementation of sophisticated technologies.

In such areas, engineers, computer specialists and other members of the technical staff tend to advocate in-house experimentation and development rather than buying proven commercial solutions.

This can be especially troublesome in the area of computer software. For a number of important manufacturing and related support functions, such as inventory management, production scheduling or materials requirements planning, commercial systems are available.

Generally, these have been tested in actual production and are of a known quality.

The same cannot always be said for in-house versions of the same systems. In fact, few areas of CIM implementation activity face a higher risk of major schedule slippage or even outright failure than a major in-house software effort designed to automate a key manufacturing function.

A number of reasons are typically offered to justify the development of systems in-house, the most common one being a lack of fit between a commercial system and the relevant characteristics of the local environment. This argument almost always deserves a second look.

While it is true that having to make extensive modifications to a packaged solution represents a complex task that can be almost as risky as developing the system in-house, extensive modifications might not actually be required.

Moreover, the function or process being automated might be more appropriately modified to be compatible with the commercial system rather than the other way around.

In most instances, an accepted industry rationale exists for the basic design and

operating characteristics of these commercial systems, particularly those that are in widespread use. Because an organization implementing a CIM program will be in the midst of a major transformation anyway, it is an opportune time to reassess existing practices.

If an accommodation can be reached between in-house needs and the characteristics of a commercial system, the use of the commercial system will entail much less risk for

the organization and will probably result in significant cost savings as well.

**Keep schedules reasonable**

Many organizations continually feel pressured to set very tight scheduling. This occurs because of the strategic significance of an effective CIM program's timely implementation as well as the pervasive and sometimes disruptive effects associated with implementing such a program. There is nothing

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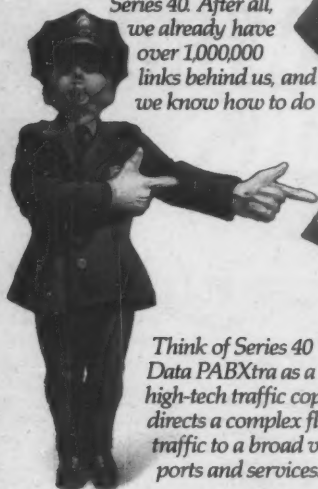


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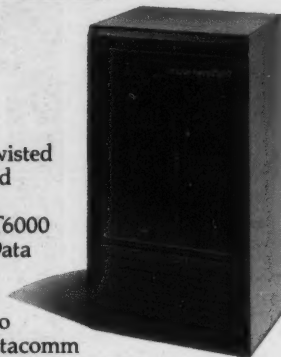
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## In Depth/Managing CIM Risks

inherently wrong with tight schedules as long as they are reasonable; reasonableness, however, cannot be viewed apart from risk considerations. A tight schedule can be reasonable or not, depending on the level of risk managers will accept.

Given the array of variables and complexities associated with a major CIM implementation program, a strong case can be made for factoring an extra measure of slack into project schedules as another way of managing risks. Without reasonable slack, there will be instances of short cuts, inadequate testing and verification and shallow design efforts.

Moreover, and perhaps even more important in some environments, an overemphasis on tight schedules will create a kind of frenzied, frenetic environment that is detrimental to morale and makes the program difficult to sell. These conditions increase the risk of element failure, and failure of the overall program as well because of the interdependencies associated with integration.

### Attention to people

A manufacturing organization as an open system includes not only functions, processes, markets, raw materials, capital and equipment but also skills, attitudes, morale and other less tangible, but nonetheless crucial, elements. These people-related elements must be addressed in an effective and timely way, or the risk of integration failure will increase.

Even if a CIM program were to be perfect in all other respects, people would still cause it to either succeed or fail. If people are not properly trained and motivated, little opportunity will exist for program success.

Because many employees will believe that the organization is performing well and does not need to move in a major new direction, numerous philosophical and motivational issues will arise. For example, groups with different perspectives and objectives will emerge and tend to slow progress. Senior management must ensure by both words and actions that the appropriate elements of a new CIM-oriented culture are established and nourished.

Cultivating employee attitudes and upgrading skills so that they are consistent with the demands of the CIM environment are not objectives that can be accomplished quickly. From the inception of the program, systematic, continuing attention must be paid to the impact of the CIM program on people.

In particular, management must place continuing emphasis on developing necessary skills and gaining acceptance of the need for new organizational structures and, for many people, new work assignments. This is an area that often receives superficial attention and has been a significant limiting factor in the implementation of many CIM programs.

Therefore, as clusters of partitions are scheduled for development and implementation, another factor to be considered in defining an implementation time line is the feasibility of developing or modifying these intangible elements in the time frame required. Because so many subtleties and variables are involved in this area, a combination of management judgment, intuition and sensitivity to the needs and attitudes of the organization's employees is the best way to assess the situation.

If it appears that some employees

will not be able to effectively support a major segment of the program, schedules and priorities must be adjusted until appropriate remedial actions can be taken.

### Integration-readiness reviews

CIM implementation managers will find it difficult to focus simultaneously on long-term integration goals and the day-to-day problems that relate to the development and implementation of individual program partitions. Because of their pressing importance and the immediacy of their demands, current issues tend to receive management's attention, while longer term considerations can be easily ignored.

A proper balance of management attention can be achieved only through the existence of a formal review process. This ensures that

long-term integration concerns are addressed on a systematic basis.

One approach would be to hold quarterly integration-readiness reviews. In these reviews, predefined integration-readiness criteria are examined, such as the projected status of major technology partitions like telecommunications networks, key information system partitions or training programs. These reviews should focus on determining if evolving developments are consistent with these pre-established macro-level criteria. If they are not, adjustments must be made.

These quarterly reviews might also represent an opportune time for obtaining outside advice and consultation. Few organizations have in residence all of the CIM expertise required for effective program implementation. Reliable, competent

external consultants can provide a valuable service in this regard.

In the absence of reviews such as these, there is an increased risk that partitions will be implemented that cannot be integrated. At best, this means that substantial rework would have to be done; at worst, the overall program could be in jeopardy.

### Effective resource management

Assuming that a successful level of integration can be achieved, there are still areas of risk associated with the ongoing operation of the new CIM organization. One of the more important areas relates to maintaining the accuracy and integrity of the data bases and information flows that represent the lifeblood of the integrated environment.

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hour-to-hour, decisions will be made based upon the organization's data base network, the data must be timely and accurate. This can best be ensured through the existence of a comprehensive information resource management program. Risks can be reduced significantly if this area is staffed adequately with highly qualified personnel from the CIM program's inception.

A good information resource management program would consist of the following key elements:

- First, a senior manager should be charged with the responsibility for maintaining a sound, well-planned, integrated information environment. This manager would develop the organizational mechanisms necessary to establish and administer data standards, define official data bases, determine information

systems development priorities and in general manage the organization's information resources.

- Next, there must be a data resource administrator responsible for ensuring that official data bases — those that are part of the integrated environment — and the systems that update, modify or access them are appropriately modeled and conform to established naming conventions and other standards.

- Finally, there must be a data base manager responsible for the

technical aspects of the physical management of data, determining, for example, where data bases are to be located and how they are to be physically structured.

Unless these positions are in place and functioning throughout the CIM implementation process and remain an integral part of the program once it is in full operation, the program will be much less effective than it would be otherwise. This is one area of risk where managers can be reasonably sure of positive results.

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*The allure of modern computer technology notwithstanding, CIM implementation progress is not likely to occur at a dramatic rate.*

A final area of risk concerns the level of management resolve necessary to direct a major CIM initiative. The risk is that implementation progress might be incorrectly perceived as occurring at an unacceptable rate. This can lead to premature and disruptive adjustments or, in the worst case, abandonment of essential parts of the program.

## Realistic expectations

The allure of modern computer technology notwithstanding, CIM implementation progress is not likely to occur at a dramatic rate. Over time, cumulative CIM benefits can be of enormous value to an organization, both in an economic and strategic sense. However, these benefits can evolve at a rate that makes them appear to be fairly modest when viewed within narrow slices of time. Moreover, CIM benefits can be indirect, intangible and otherwise unyielding to direct, short-term measurement.

This risk offers certain implications for management. First, managers should attempt to use accounting and control systems that are consistent with the progress and benefit characteristics of CIM programs. These systems should be able to reflect progress in such areas as improved manufacturing flexibility and higher product quality.

Second, managers should expect progress to occur at a gradual rate and should factor this into the CIM implementation strategy. Finally, managers should expect to feel demands made on their patience and perseverance — these qualities will certainly be tested.

The implementation of a major CIM program represents a fundamental transformation in the nature of a manufacturing organization. During this transformation, the organization changes from a system having a relatively low degree of coherence among its elements to one having a relatively high degree of coherence.

Coherence is increased by the establishment of new, more sophisticated relationships among existing elements, the introduction of new elements and new relationships or the removal of previously important elements. This transformation usually takes place in a dynamic environment, which makes it difficult for an open system to establish and maintain a steady-state operating condition. This all results in a high degree of risk, which must be managed effectively if a CIM program is to have a reasonable opportunity for success.

CIM implementation risks can be managed through diversifying, or effectively partitioning, the program; management insistence on simple solutions; avoiding excessive software integration; maintaining a policy of buying proven solutions whenever possible and encouraging reasonable schedules.

Additionally, attending to the needs and attitudes of people, carrying out integration-readiness reviews on a systematic basis, ensuring the existence of an effective information resource management program and maintaining realistic expectations based on appropriate control measures are other approaches that can be employed. Putting these approaches in place will help management maintain the manufacturing equilibrium and, perhaps, the organization's competitive position in the marketplace. ■

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## In Depth

# New goal for chargeback:

## Shift from cost accounting to a positive balance

By JAMES EMERY

*Chargeback can encourage technology exploration and boost efficient usage • How to handle variance between projected and actual costs • Acid test for chargeback: Does it motivate?*

**I**t is fair to say that no organization has solved the chargeback problem. At best, one can only aspire to achieve a reasonable and practical approximation of the ideal system.

In designing a chargeback system, it is particularly important to avoid some of the more serious hazards of such systems: unproductive red tape, unnecessary complexity from the end user's viewpoint and counterproductive incentives.

At its worst, chargeback can reduce an end user's willingness to fund initial applications of a promising new technology if it involves a relatively high risk or if it primarily benefits the organization as a whole.

### System goals

A well-designed chargeback system should meet a number of goals. Chargeback should, for example, promote the cost-effective use of information services. This is not a vacuous goal; it should be the basic operational philosophy that underlies the system.

This philosophy implies that such goals as equity and the ability to account for costs are not, in themselves, sufficient reasons for a chargeback system (although perceived equity and generating good cost accounting data are obviously important subsidiary goals). The real test of chargeback is what effect the charges have on users and staff personnel and whether the

expected effects increase efficiency and effectiveness enough to justify the cost of administering the system.

The chargeback system also should be understandable to those it is designed to motivate. Since chargeback is designed to motivate desirable behavior on the part of end users and MIS personnel, it should be understandable enough for them to make reasonable decisions and to get reasonable results.

That does not necessarily mean that the system will be simple; indeed, the underlying complexity of the issues cannot be made completely transparent to users of the system. Users consuming large amounts of information services should be willing to deal with some of the complexities because the stakes are high for both themselves and the MIS department.

For relatively small users, however, the stakes may not be sufficient to justify a chargeback system that achieves that last ounce of efficiency; in such a case, a simple system such as a fixed annual fee negotiated in advance may be quite adequate.

Another goal is that the system be reasonable to administer. Like any other information system, the chargeback system should be cost-effective. That means that the cost of designing, operating and maintaining the system should be less than the benefits it provides — that is, the increased efficiency and effectiveness it fosters.

Again, this implies that charges to small users should be simple and inexpensive to

### About the author

Emery is Professor of Decision Sciences at the Wharton School, University of Pennsylvania, and has 10 years' experience in the private and government sectors. He specializes in decision support systems, the economics of information and strategic uses for information.



COW PHOTO BY P. CHARLES LADOUCEUR



## In Depth/Chargeback Systems

administer. Even for the larger users, the system should not be any more complex than necessary to bring about the desired effects.

**Special circumstances**

The chargeback system must take into account the nature of information systems. Unless this is done, some serious counterproductive incentives can be built into the charges allocated to users. The following phenomena should be considered:

**High fixed cost, low variable cost.** Although the cost structure of information systems is by no means unique, it tends to reflect a more pronounced fixed-cost component than most other economic activities. This is especially true of software and shared data, in which the incremental cost of serving an additional user may be negligible relative to the

fixed costs of developing and maintaining these resources.

**Growing importance of software and data bases.** In most chargeback systems, the allocation of hardware costs commands primary attention; however, the costs of software and data are also becoming increasingly critical components of data processing budgets. Chargeback methodology must be modified to take this into

account, lest chargeback be directed to an increasingly smaller part of the total problem.

**Rapid rate of technological change.** Hardware costs tend to drop about 20% per year. This downward spiral has important implications concerning charges over the multi-year life of a computer.

**Proliferation of dedicated mini-computers and microcomputers.**

**”**  
*Adding an allocated portion of the fixed costs suppresses demand, thus presumably causing users to forgo useful computing services without achieving any corresponding savings for the organization as a whole.*

The rapid drop in hardware costs makes it feasible to provide end users and departments with their own specialized computing facilities. An example of such a system is an office machine that might combine word processing, communications and desk calculating functions.

**Multiyear hardware planning to meet rapid growth.** During the past five years, growth in raw computing capacity has ranged from an estimated 40% to 60% annually to meet user demands. In an environment of such rapid growth, MIS often must acquire sufficient hardware capacity now to meet the needs for several years. Demand during the first year or two is typically considerably less than the eventual saturated level.


**Uncertainty about the costs and demands on a facility.** No matter how well planned a computer center may be, some uncertainty will remain regarding the level of demand from users and the level of costs required to operate it. Therefore, the amount charged out to users at a predetermined rate will never match exactly the actual costs incurred. Short of a retrospective chargeback to users (which is not recommended, as discussed below), a variance will remain in the accounts of the computer center.

**Suggested procedures**

A successful chargeback system is likely to be fairly complex and entail a variety of approaches. It should not be rigid, treating all users in exactly the same way. A system adequate for one class of user — the large users, for example — would not necessarily be best for other users. The manager of a computer center should have the same sort of flexibility and discretion that a manager typically would enjoy in operating an independent computer service bureau. Consistent with that view, the following suggestions are offered as a useful starting point in reviewing chargeback procedures:

- Charge on the basis of long-term marginal costs. These are the costs that often vary over the long term —

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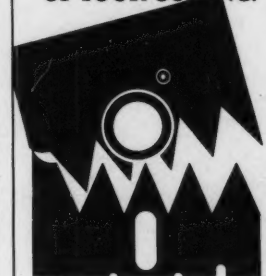
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two or three years — depending on the level of use. Hardware costs should be included, on the grounds that even major hardware adjustments could be made within a time span of two or three years.

The truly fixed costs — those costs that would not vary even with major changes in the level of use — should not be included. Adding an allocated portion of the fixed costs suppresses demand, thus presumably causing users to forgo useful computing services without achieving any corresponding savings for the organization as a whole.

- Control fixed costs directly. The fact that users have no control over the fixed-cost components does not imply that the costs are not controlled at all; they are simply controlled directly, rather than indirectly, through users.

Residual costs not included in the chargeback base should be budgeted and controlled through the normal budgetary process. Thus, the MIS department should be required to submit an annual budget request for the fixed costs, which would then be reviewed by top management along with other corporate expenses.

- Control variable costs indirectly. The costs included in the chargeback base should be managed and controlled by users; they need not be controlled separately through the budget of the computer center.

Revenue generated through user charges should be available for use within the computer center without detailed review and approval by corporate management. This approach is consistent

with the philosophy that users should be responsible for controlling the level of expenses for meeting their own computing needs, while MIS management should be responsible for providing an efficient source of services at a standard price.

- Use standard costs rather than actual costs. Rates should be fixed annually, based on the expected costs of running the computer center and on the expected demand for various services,

and rates may be revised at mid-year. Actual usage should then be charged on the basis of the standard rates.

In general, then, a variance will occur at the end of the budget year because the volume of usage will differ from the expected level and because the costs of operating the computer center will not match the budgeted amount exactly.

In standard managerial accounting procedures, the

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**Residual costs not included in the chargeback base should be budgeted and controlled through the normal budgetary process. Thus, the MIS department should be required to submit an annual budget request for the fixed costs, which would then be reviewed by top management.**

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In pioneering work with applications for space-based defense systems and the next generation of missile seekers, Hughes Aircraft Company has demonstrated an advanced infrared sensor. The device is believed to be the world's first high-density, staring, long-wavelength infrared focal plane array (FPA). The hybrid chip, smaller than a fingernail, is integrated with optics and electronics to create TV-like images of a scene, even in total darkness. Unlike conventional infrared sensors, which mechanically scan a scene by means of oscillating or rotating mirrors, the FPA stares at a scene in its view at one time. It promises significant performance, size, weight, and cost benefits over ordinary sensors. The device was developed for the Defense Advanced Research Projects Agency as part of Strategic Defense Initiative efforts.

The tagging of thousands of wires in a typical communications satellite has been simplified by a new computer printing system. Proper identification of wires is crucial for assembly and testing, so each wire is assigned an identification number. Up to now, the numbers have been typed by hand on a plastic sleeve. This procedure is time-consuming since, for example, there are 30,000 wire terminations in an Intelsat VI satellite. But Hughes engineers recently developed a special plastic sheet of sleeves that can be printed by computer. The sheets are made of a material that passes NASA's requirements for materials used aboard spacecraft. In addition to speeding manufacture, the new computer sleeves cost only eight cents each versus 55 cents for the old style.

Helping to trim energy consumption is one major use of a hand-held infrared viewer. The device is a Hughes Probe® viewer, which senses heat and displays images through an eyepiece. Mining officials use the device to inspect electrical systems and mechanical equipment because it detects potentially dangerous short circuits and overheating hardware. Real estate owners, developers, and appraisers use the viewer to determine the structural and thermal integrity of buildings. The unit reveals moisture spots in roofing and spots where buildings might be gaining or losing heat.

Over 100,000 TV channels are now being carried to cable television subscribers in the U.S. by means of Hughes' AML microwave systems. AML (Amplitude Modulated Link) was developed as a way to deliver multichannel television programming to cable TV hub sites, much as a trunk cable does. An AML system can carry up to 80 TV channels simultaneously. At least half of the nation's cable subscribers in over 1,500 communities receive TV programming by this technique. AML microwave equipment is used in more than 500 cable TV systems in the U.S., Canada, Mexico, Belgium, Switzerland, Austria, Denmark, Finland, and Argentina.

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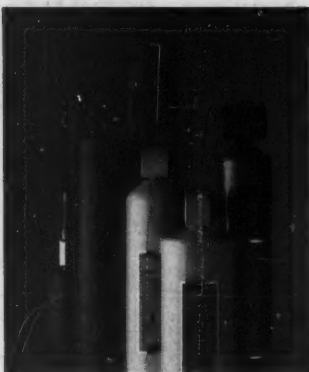


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A financial services company in a state of rapid growth needs a state-of-the-art information system technology. That's why Beneficial Corporation turned to Cullinet Software and its three-level integration. Serving credit, banking and insurance customers around the world, Beneficial will utilize Cullinet's IDMS/R, Fourth Generation Applications and Information Center Management System. Together they will give Beneficial the speed and accuracy that sets their financial services apart. Beneficial recently bought Cullinet applications packages to handle everything from general ledger to human resources management. And they're convinced that the flexibility and responsiveness of Cullinet's relational architecture will let them react quickly and positively to the pressures of a highly competitive business environment.



## MONROE DID.

The ability to leverage production with truly efficient decision support is what put Monroe Auto Equipment Company on the road to Cullinet's IDMS/R, Manufacturing Applications and Information Center Management System. The world's leading manufacturer of automotive ride control systems, including popular Monroe shock absorbers and struts, they required Cullinet's broad product offering. Their objectives: reduce inventory, cut scrap and improve labor efficiency. They're meeting these objectives. Cullinet's technological superiority has allowed Monroe to improve planning of its manufacturing operations - manpower, machines and materials - while it helps generate a production schedule that more closely corresponds to its customers' requirements. The Cullinet solution is definitely making business run more smoothly at Monroe.



## COSMO OIL DID.

Three oil companies merged to create Cosmo Oil - Japan's third largest supplier of petroleum products. That also created the problem of trying to coordinate three disparate methods of importing, refining and distributing petroleum. Cosmo's management team agrees they would not have been as successful without Cullinet products and the leadership and timely support of Cullinet's Japanese representatives. They installed IDMS/R in October of last year. Within five months, it was running every facet of Cosmo - from petroleum import to sales and accounting. The system quickly improved distribution and inventory management, and reduced system development times. Cullinet has allowed Cosmo to meet the challenges of their business in a fraction of the time and at a fraction of the cost of competitive systems.



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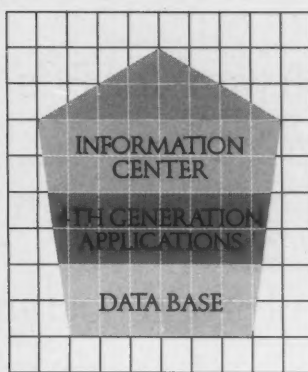
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The largest self-select shoe chain in the Southeast, Pic 'N Pay is growing by more than 80 stores a year – a rate that requires some pretty fancy information system footwork. Fast and simple development of new applications software is a must; Pic 'N Pay discovered that Cullinet's versatile end-user tools were the answer. IDMS/R with ADS/OnLine has allowed them to realize major long-term savings in maintenance time, while maintenance costs have been cut in half. It's a powerful solution that Pic 'N Pay uses to process up to 300,000 batch transactions nightly. Similarly helpful in getting the right shoes to the right store at the right time are multiple copies of Cullinet's micro-to-main-frame link, INFOGATE. Now Pic 'N Pay has an integrated system that's setting them off on the right foot for future growth.



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**Charges based on output measures — the number of credit accounts maintained, paychecks written or invoices issued — could be used as the basis of charging users.**

total variance is broken down into these two components — typically called the volume and efficiency variance — to identify the source of variances and to assign managerial responsibility for controlling them.

Residual variances can be handled by allocating them back to users through a retrospective change in rates. Other options include rolling variances into the next year's budget — thereby including them in setting the next year's rates — and writing them off as a general corporate overhead expense for the year.

Allocating the variances to users serves no managerial purpose, since users would have no retrospective control over their past usage.

Rolling variances forward is reasonable if the variances are the result of multiple-year plans. If the variances are a result of temporary and unplanned causes that do not affect the next year's activities, then it is better simply to write them off as general overhead expenses.

### Motivation

- Use price differentials. Rates should be set to motivate users to behave in an efficient way. For example, if significant excess capacity exists at night, rates at night should be lower than the prime-shift rates. How much of a discount should be given depends on how much motivation users need to change their usage, assuming that users do indeed have some discretion regarding the timing of their demands on the system.

In addition to time-of-day differentials, MIS also can adjust chargeback rates on the basis of the level of priority. Some companies offer users the option of a lower rate for totally deferrable jobs. MIS will run these jobs only when the system is idle, so they are given the lowest priority. There is no guarantee even of overnight service; the job may be run the following weekend. But the rate drop might represent a 5-to-1 cost break, compared with a 3-to-1 break if jobs are run overnight.

A further example of a legitimate price differential is a special introductory rate for a new service in order to compensate users for the additional cost of organizational learning.

- Use output-related charges when possible. Most chargeback systems charge on the basis of the input resources used in generating the outputs, input resources such as CPU seconds, memory occupancy time and I/O transfers. Such charges are often meaningless to nontechnical users in the same way the price for an automobile would be meaningless if it were expressed in terms of pounds of steel and aluminum or hours of machinists' time.

Charges based on output measures — such as the number of credit accounts maintained, paychecks written or invoices issued — could instead be used as the basis of charging users. Each such output would have a standard price, based on the expected cost of producing it, in the same way a base price exists for an automobile, based on the expected resources needed to produce it.

A variance between actual costs and the total charges allocated to users could then be handled in one of the ways discussed above.

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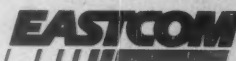
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## In Depth/Chargeback Systems

# FAA sets pace for federal chargeback

By DEAN HALSTEAD

The Federal Aviation Administration (FAA) recently implemented a chargeback system that puts it in the forefront of the federal government in terms of managing DP resources. The FAA responded both to federal policy and to the direction of the FAA administrator when it decided in the summer of 1983 to implement chargeback in its 12 administrative DP centers.

"The FAA decided to seek outside assistance," project manager Harvey Kaplan says, "because of limited resources and expertise with charging systems." The FAA sought help from another federal agency, the Federal Computer Performance Evaluation and Simulation Center (Fed-sim). The full-scale chargeback system is now in place — except the cost recovery portion, scheduled for completion during fiscal 1989 — and Fed-sim continues to provide support.

The project to design and develop the FAA charging system took three years to complete; it was implemented in July. In the course of this project, the project team identified numerous issues faced by all MIS managers implementing a chargeback system for the first time.

A crucial issue arose early in the project: determining which organizations should be part of the charging system. Only senior FAA managers could make this decision because the process of budgeting funds for the identified organizations could be affected. Moreover, the efficiency with which the organizations operated would become highly visible, and many of the organizations might resist the change.

Another crucial issue was to identify what services were being provided and how to handle similar services provided by different types of hardware. The first part of this issue addresses

the classical concept of chargeback algorithms.

"The FAA decided early on that it wanted a system that users could easily understand," Kaplan says. For now, the FAA has decided to base charges on resource-based services, such as CPU time, communications and tape and disk storage. For the future, the FAA aims to use output-oriented or transaction-based services, such as charging on a per-check or per-report basis.

## Single processing charge

Determining how to handle different types of hardware that provide similar service proved more difficult to resolve. Should charges be based on a separate CPU service for each type of computer? The FAA, for example, uses systems from IBM, Data General Corp. and Wang Laboratories, Inc. Or should there be a single processing charge for services provided by all types of hardware?

The FAA took a big step into the future of information management by deciding to select a single processing service. With this choice, the FAA was saying it would provide basic service via an integrated organization, even though it was geographically dispersed.

A closely related issue was determining rates for the services. The options were to choose local rates — set for each DP facility — or national rates, where a CPU hour costs the same in Alaska as it would in New York. The FAA selected national rates, furthering the concept that the DP organization was providing services to the entire FAA, regardless of location.

"The basic philosophy the FAA chose to follow," Kaplan says, "was that as long as their work was completed, the users shouldn't be concerned with how or on which machine the work was processed." Since all the DP centers are connected by a single network, treating the whole organization as one entity also enables DP to allocate the cost of the network more fairly.

The question of who became involved in the design and development process needed to be answered fairly early in the project. Senior FAA management established a charging team that represented end-user departments, accounting, budgeting, data processing, management and the charging system experts. "The composition of the team contributed to the project's success by providing the forum for communication and collection of vital information," Kaplan says.

The team worked from a federal guideline for developing and implementing chargeback sys-

tems, written by myself and Ken Giese while we were analysts for Fed-sim and adopted as a Federal Information Processing Standard Publication (FIPS PUB 96). The publication provides a model of an operational charging system based on a rate-setting subsystem and a billing subsystem. Components of the rate-setting subsystem include usage forecasting, cost forecasting, billing rate calculation and DP budgeting assistance. Components of the billing subsystem include DP accounting assistance, usage accounting, usage reporting and cost recovery. The publication also provides a step-by-step methodology for implementation. "The methodology, with some minor variations, was followed and resulted in a highly successful project," Kaplan says.

Determining exactly who the DP users were turned out to be a little more difficult than first anticipated. The major issue revolves around who should be held accountable for the consumption of the services. After some thought, the project team determined that it made sense to identify as users those individuals who could increase or decrease the consumption of services. Thus, the DP services that were consumed while running the FAA uniform accounting system were billed to the accounting department.

## Seeking total cost recovery

The FAA also had to choose a philosophy for setting the final rate per unit of each service. The choices were rates based on forecasted utilization, on expected capacity or on theoretical capacity. Rates based on forecasted utilization ensure that total DP costs are reported and eventually recovered, so the FAA chose to set rates on this basis. Federal policies demand that total costs must be reported or recovered.

The team also needed to determine how to track or meter utilization of the FAA administrative DP centers. Last, the team had to decide whether to develop software to perform the data reduction and reporting or bill preparation functions or whether to buy a package from a commercial vendor. The FAA weighed functionality vs. expense and maintainability and finally decided to use a commercial package, thus avoiding the expense of custom development.

"The FAA is committed to the philosophy that charging systems foster," Kaplan says, "which is, only by implementing modern business management techniques can we ensure that the FAA's data processing resources are managed in the most efficient and effective way possible." ■

*Halstead is cofounder of Vance Government Systems of Chantilly, Va., which provides consulting support for the federal government in software development and charging. He was responsible for the initial design of the FAA's chargeback system before he left Fed-sim.*

end users. The scheme also places responsibility where it belongs: on users for expressing service needs in business terms and on MIS personnel for delivering services at a standard rate agreed to in advance.

The one limitation of this approach is that it can only be used for standard services or products for which a standard cost has been determined. Nevertheless, its applicability is much wider than current practice would suggest.

## Toward standards

- Use fixed prices when possible. Going one step further on the road to standardization, it is sometimes possible to set a fixed charge to cover a given type of service. For example, users might pay a fixed fee to have unlimited use of an interactive, time-sharing terminal.

This approach only applies when there is a definite limit on resource consumption, such as a physical process that imposes a constraint on CPU usage.

In the case of the time-sharing service, for example, MIS can tailor the operating system so that an end user receives a portion of CPU cycles at a metered rate. That way, one end user cannot monopolize the entire machine and have a significant ef-

fect on other users.

A fixed annual charge could also be applied to charge for the use of a software package or a shared data base. It is even appropriate for high-volume transaction processing systems if resource consumption can be predicted fairly accurately over the period covered by the negotiated fixed price or if the using organization has little discretion over resource consumption.

In all such cases, the fixed-cost approach recognizes the economic fact that most of the cost of providing the services is the result of providing the capacity, whether or not the services are used. These fixed costs are merely transferred to users through the annual fee. In addition to the fact that this approach is based on economic reality, it is also easily understood and managed by users, and it reduces red tape to a minimum.

As organizations move to the widespread (if not almost universal) use of interconnected networks of personal workstations, a fixed charge per workstation provides a practical approach to funding the infrastructure.

Most users on such a system consume a small and fairly predictable level of resources, making a fixed

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charge quite feasible for low-volume users. For example, one organization found that 95% of its user population collectively consumes only 25% of the capacity of a network that provides unconstrained access to personal computing services.

As a corollary to the above guideline, the MIS department should charge extra for services that are discretionary, unpredictable and significant in dollar amount or in their impact on other work.

An on-line inquiry system often falls into this category. Because of its discretionary nature and the cost of providing unlimited use of such a system, users can consume a significant level of resources.

It therefore makes sense to attach a variable cost to such services. It would be desirable to establish a standard price for each inquiry, but because of the variability in the inquiries, it may be viewed by management as necessary to charge on the basis of the use of specific processing resources — CPU time, I/O and so on.

In some cases it is worthwhile to enter a long-term contract with the users of a service to get a commitment from them to pay for the costs that are incurred on their behalf.

This approach might be applicable, for example, when a user department is contemplating installing its own distributed processor.

The MIS department might, instead, contract at a fixed price to provide an equivalent level of service on a shared processor. Similarly, a user wanting a large volume of on-line disk storage might contract with the MIS staff to obtain a dedicated drive at a cost lower than the normal, in-house "retail" price. Here the user absorbs the cost of both the risk and the idle time.

### Avoid hidden subsidies

- Charge users for dedicated resources. Any resource dedicated to a given user or organizational unit should be charged directly to the user with perhaps some markup to cover variable administrative costs.

In this way, the cost for such a resource is not added to the charging base to be charged to all users, who would then be providing a hidden subsidy to the user who benefits from the dedicated resource.

Departmental minicomputers, personal workstations, specialized software products and technical support persons with specialized skills applicable to a single department are examples of dedicated resources that should be treated in this way.

- Unbundle charges when possible. It is desirable to use

an a la carte approach to pricing when possible — that is, to base charges on the individual services rendered, rather than lumping many costs into a general overhead account that is then spread to all users.

Users of raw CPU cycles in a large mathematical decision model, for example, should not be expected to pay for specialized applications software, printers and forms changing that they do not use through an overhead

charge based on their CPU utilization.

It is especially important to bring charges into line with economic reality, now that users often have a viable alternative in acquiring their own minicomputer. The services of the central facility should not be placed at a disadvantage in cost comparisons owing to hidden subsidies of bundled services.

Some MIS departments may resort to such subsidies as a way of funding valuable

”

*The fixed-cost approach recognizes the economic fact that most of the cost of providing the services is a result of providing the capacity, whether or not the services are used; these fixed costs are merely transferred to users through the annual fee.*



One of the most significant developments in IBM ASCII terminals is the one you may never use.



## In Depth/Chargeback Systems

services that might not otherwise find support, but often this reflects MIS's dysfunctional compulsion to charge out all other costs in order to end with a net balance of zero.

- Base your costs on multi-year planning. If a computer or a software product is installed with the expectation that growth will occur during several years, then the charges should be based on expected costs as well as on the expected usage over

the planning period.

This approach will mean that charges during the early years, before usage has built up to full capacity, will not fully recover actual costs. In later periods, however, the deficit will be made up by cost recovery that exceeds actual costs.

The standard rate should be set so that all costs are balanced at the end of the multiple-year planning period, assuming that actual use and costs match the predict-

ed levels during the planning period.

This approach requires setting up an account for holding the deficit expected during the early years.

- Recognize technological obsolescence. As costs decline on average of about 20% per year, hardware that was acquired several years earlier begins to look expensive when it is compared with newly released equipment. A possible approach to this problem would be to use

a depreciation charge that declines during the useful life of the hardware at a rate that is expected to match the decrease in costs.

Alternatively, a short write-off period can be used so that the organization is not stuck with obsolete equipment with an unrealistic book value and a high unit charge.

### Fix prices

- Use fixed-price development contracts, when possible,

to eliminate the surprise of an unexpected development cost.

A fixed price transfers much of a project's economic risk from the user to the MIS department, which is often able to exercise a greater degree of control over costs.

It would, however, be unreasonable for the MIS department to assume the risk of a fixed-price contract over the full development cycle of a major project.

This problem can be circumvented by establishing a fixed price for each stage in the development process — gross design, detailed design and so on.

At each stage, MIS can supply users with estimates as to a project's long-term costs and benefits, but no commitment to a fixed price need be made beyond the next stage.

Users may feel more comfortable with a fixed cost for

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|--|------|------|------|------|
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| DEC VT220/100/52                         |      | X    |      |      |
| DEC VT100/52                             |      |      | X    |      |
| DEC VT220 w/Hot Key/3708                 |      | X    |      |      |
| Hazeltine 1500                           | X    | X    |      |      |
| Lear Siegler ADM-3A                      | X    | X    |      |      |
| Lear Siegler ADM-5                       | X    | X    |      |      |
| TeleVideo 910, 910+, 912, 920, 925, 925E | X    | X    |      |      |
| TeleVideo 950                            |      |      | X    |      |
| WYSE 50/50+                              |      | X    |      |      |
| IBM 3101                                 | X    | X    | X    | X    |
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*It is especially important to bring charges into line with economic reality, now that users have a viable alternative in buying their own minicomputer.*

the full project, but such certainty is an illusion in the case of a large, complex project.

A so-called "creeping commitment" approach is merely a formal recognition of the intrinsic uncertainty that is inherent in software development.

In the case of a modest-size development project, or one with relatively little technical uncertainty, it is often quite reasonable to set a fixed price after a brief feasibility study, which should also be performed at a fixed price.

- Capitalize the development cost for large software projects, not in the formal tax sense, but by treating the software as an asset rather than as a current expense.

If the cost of a software project is a significant proportion of an organization's annual budget, the manager may be discouraged from incurring large current expenses that would provide benefits solely in the future — quite possibly for successors.

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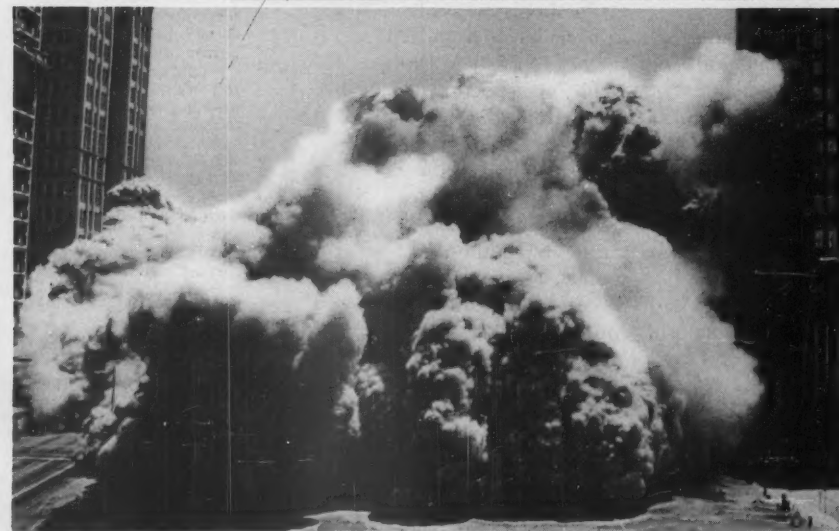
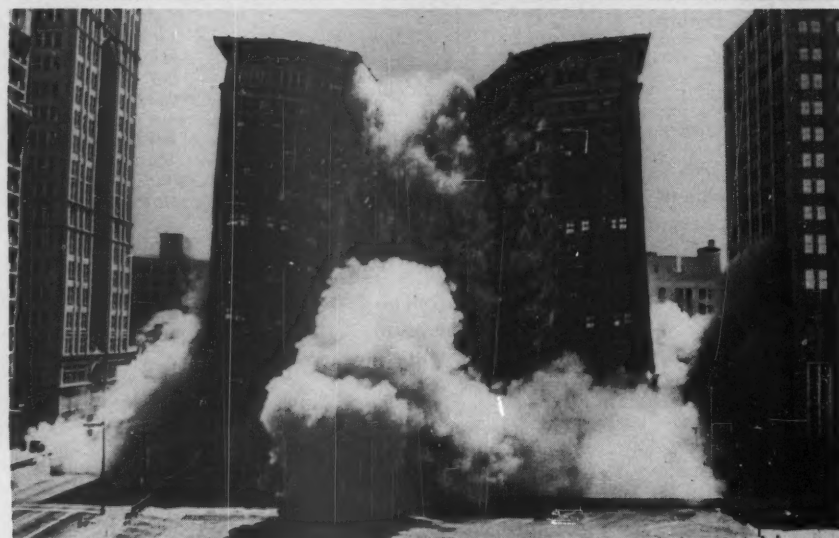
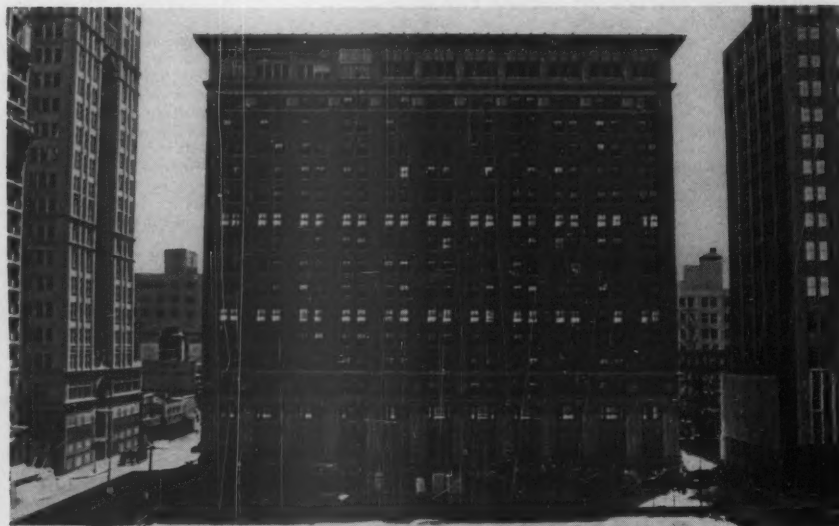
The treatment for tax purposes need not be the same as for management control purposes, although handling the cost in two different

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## In Depth/Chargeback Systems

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*Users may feel more comfortable with a fixed cost for the full project, but such certainty is an illusion in the case of a large, complex project. A "creeping commitment" approach merely recognizes formally the intrinsic uncertainty in software development.*

ways adds to the complexity of cost accounting.

### Exploration is crucial

- Fund some projects at the corporate level. One disadvantage of a chargeback system that charges users for all costs is that it is likely to discourage relatively risky development projects, or projects aimed at meeting a broad need throughout the organization. Given the rapid rate of technological change, it is absolutely essential that the MIS department devote at least a modest fraction of its resources to exploratory projects. Typically, 5% of the budget is adequate, 10% generous.

These projects should be budgeted and planned at the corporate level (or major division level, in the case of a large organization), with users paying for only those costs directly associated with installing an application for them.

Costs could be capitalized and then recovered through a usage charge, or they can simply be written off as an overhead cost at the corporate level. In either case, control of such costs would flow through the normal budgetary process exercised by corporate management.

- Develop a reporting system tied to the chargeback system. Consistent with the concept that users should exercise control through the chargeback system, a reporting system should be developed that gives users the information they need to control their DP costs.

Reports should be provided at whatever frequency seems appropriate so that users are informed of their charges and any deviation between the actual and expected charges.

### Real test of a system

Development of a chargeback system along the lines suggested is clearly a large undertaking. The system has to be developed incrementally over several years. Its design raises some difficult political and organizational issues.

Undoubtedly, not all of the suggested guidelines would be worth implementing for any one organization. Nevertheless, the task of designing a chargeback system is important enough that serious attention should be given to the issues raised here.

However, MIS managers should avoid a fruitless quest for the perfect chargeback system. It does not exist. Any system will inevitably call for a host of subjective judgments and approximations.

The real test of the system is a thoroughly pragmatic one: Does it increase the efficiency and effectiveness of the organization's information system?

Chargeback system designers can take comfort from the fact that modest errors in setting chargeback rates do not generally carry significant penalties in terms of inefficient resource utilization. For example, if

the charge for a standard output is set somewhat too low, the resulting distortion in resource allocation will generally be very minor.

Furthermore, periodic adjustments of such charges can prevent any long-term distortions. In any case, errors in estimating chargeback rates will probably cause considerably less harm than failure to apply sound principles of chargeback. ■

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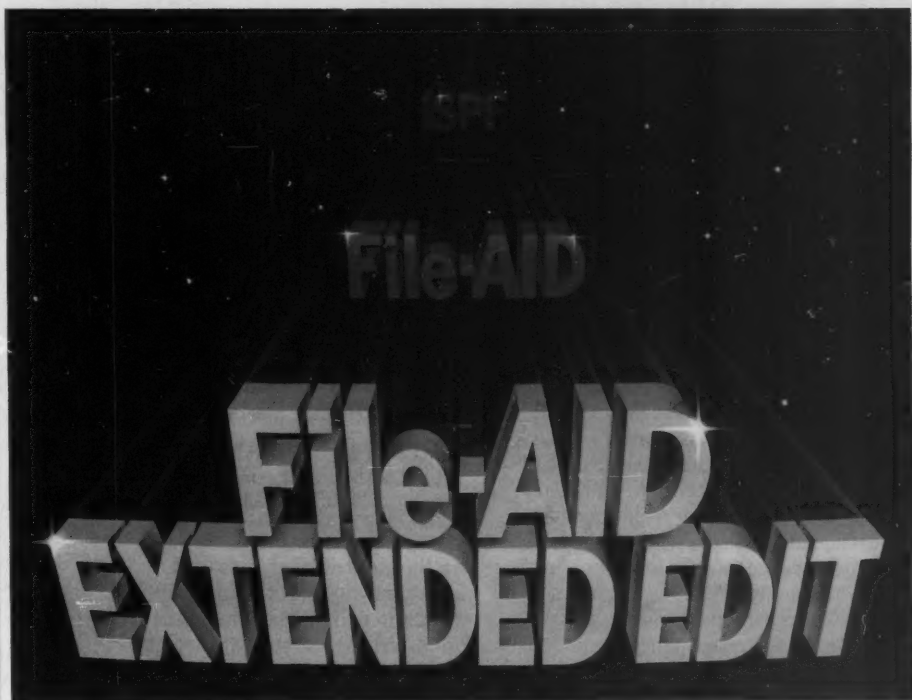
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## In Depth

# The first two years, four months, two weeks and seven minutes of A new system's life

By DANIEL NOLAN

- Relational data bases and 4GLs make prototyping mandatory
- Show a working prototype to users in two weeks — or else

**T**he modern computer system is a time machine. According to government sources, a systems project typically takes more than two years to get approved and off the ground. The project's first working model should be demonstrated in the first two weeks of the project's inception, seven minutes of which is spent installing the first prototype. The prototype will move from pilot to production in the next four months or so — depending on the nature and amount of motivation the DP manager applies to the development team.

Prototypes are the essential first result of development. Aircraft have been prototyped since they first went into production — a first flight often revealed more about the aircraft's faults than its builders would care to have commercial passengers experience. The first bow and arrow prototype was undoubtedly tested against a bunny rabbit before Alley Oop let fly at Bre'r Woolly Mammoth.

With modern relational data base management systems and their very high-level fourth-generation languages, prototyping has become mandatory. The nature of computer application system prototyping is such that the prototype will be processing live data through the computer within two weeks of its creation and after that time will need guidance from those who are destined to be users of the new systems.

### New application of existing technology

The one point that needs to be clearly understood before making a first attempt at prototyping is that a prototype is a new application of existing technology. Nothing needs to be prototyped twice.

Prototyping is a discipline that benefits from tight schedules. If two weeks elapse without the end users seeing actual results to which they can relate, management must assume that the project is in trouble and should cautiously investigate the situation.

If the developers cannot produce a demonstration that can be recognized as an early form of a system, their management should interview them to determine what the problem is. If their response indicates that they are not disappointed with their own progress and that they have been working on the machine all along, management should point out that it has already been established that the machine works. If there are no problems other than this misplaced satisfaction, the project can be

brought back in line with a firm reminder that the objective is to produce a working application system.

Prototyping is results-oriented rather than project-oriented. Emphasis is placed not so much on the method employed as it is on the overwhelming need to bring the computer to the people who will be using it in a form they can recognize and then to make the system do what is necessary to satisfy them. Conversely, the end users will become acquainted with a few of the requirements of the computer and of system development — time and money.

The design methods employed in the pre-



CU PHOTO BY P. CHARLES LADOUCEUR

liminaries will result in descriptions for the files needed to contain the data and the processing expected of the programs. Prototyping, by immediately proving or disproving the workability of the design, will determine to what degree the investment in analysis has contributed to the project's goals.

### The first two weeks

The first prototypes are concerned with getting the file design down pat. After the walk-throughs have commenced in earnest, concentration is directed toward the programming, installing routines, algorithms, cosmetics and processing sequence. This approach emphasizes speed and flexibility and may not agree with commercially marketed system design methodologies.

The initial prototyping period covers

### About the author

Nolan is an Annandale, Va.-based computer scientist working with SHL Systemhouse of Canada, a systems integrator. He specializes in DBMS and fourth-generation languages.



## In Depth/Two Weeks to a Working Prototype

the first two weeks of the new system's life. In those critical weeks, the only three steps that need to be accomplished are the following:

- Build the file and make sure it works.
- Make the order of processing conform to specifications.
- Install legal and logical edits and make necessary changes.

No programming is to be done without first establishing a file. To do otherwise would be like putting bread in a toaster that is not plugged in. The file provides the power needed for the DBMS language to work.

#### Assumptions

Because this is a discussion of prototyping, we will assume simply that the file design has been done. In reality, prototyping begins with the assumption that this work has been

done. This means that we define the file to the data base management systems, put data in and make sure nothing leaks out.

Work is done in three steps. First, build the physical and logical file or files. Next, test the file against an Insitu, or update logic replacement, program. Then, test the file against a user.

Files are constructed before any programming is done. Before the

files are put together, two assumptions should be made. One, all work needed to tell precisely what is in the file has been done, and two, inevitably something vital will be missing.

Those who plan their work with these assumptions in mind will avoid arduous drudgery and the resulting unacceptable sacrifice of self-esteem.

In simpler terms, the initial investment is kept low to avoid having to explain later why so much time

and money was spent climbing mole hills.

Once begun, the steps that were taken to create the original prototype will be exercised repeatedly. It is this process of using multiple iterations to arrive at the best design and highest performance that makes the speed of the prototyping so critical. The amount of effort expended must not be a criterion of successful prototyping.

The assumption — that all work has been completed but with errors — is necessary to successfully cope with the criticism that accompanies the introduction of a system. Where the objective is to sell a system, criticism must be met by rebuttal. When the objective is to build software, criticism becomes a vital part of the cycle, as the following factors indicate.

- Developers are unlikely to question a design before they see it in action. After seeing a live system, they are more than liberal with their criticism.

- As soon as it is demonstrable, developers will want to show it to the client. This interest wanes rapidly with time. A 1-day-old system is shown with far more candor than is a week's effort.

- Clients are seldom satisfied with initial efforts. They always know what they want and will tell you as soon as they see it.

- Clients are the real experts in the job at hand but are easily intimidated by a computer. When asked to review a working system, they will penetrate much further into the details of daily operation and may even offer constructive suggestions.

- The sooner clients review work, the more likely they will be to detect problems and specify changes. Customers assume responsibility and detect problems before a significant investment has been made. Either way, tails are kept out of a collective sling.

#### Data definition language

File building begins by entering the data dictionary language (DDL) in the format required by the DBMS

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## In Depth/Two Weeks to a Working Prototype

utility. This is done simply by entering into the computer the file definitions, one line for each field.

Note that this is a simple task. If the first file definition has not been fed to the computer by the end of the first day, check on the kind of work the developers are doing. If they are still defining fields, let them continue but consider scrapping the methodology. The only other excuse for delay might indicate a need for enrollment in

a remedial typing course.

The best method to ensure that the data description module (DDM) and field description table (FDT) remain in sync is to make all substantive alterations to the DDL and avoid depending on other capabilities until the system is in its pilot or production phase. At that time, firm controls will be required, and the compiler will not conflict with the need to make rapid file adjustments.

DDL is as much a form of

source code as anything else in the computer, and the same rules should apply in all areas. Just as it is inadvisable to allow programmers to catalog, patch or otherwise create object modules (such as the DDM and FDT) for which there is no source, the DDL should be kept in synchronization with the DBMS file and the data dictionary.

The DDL defines the files to the DBMS and to the high-level fourth-generation pro-

gramming language. Retrieving everything from a single source prevents synchronization problems.

### Data dictionary

The time required to install a file is one minute — this is multiplied by the number of typing errors discovered by the DBMS loading utilities. The fourth-generation language can get everything it needs to process the file from the DDL, including names, lengths, formats,

keys and so on.

However, be aware that otherwise excellent DBMS product developers tend to snatch defeat from the jaws of victory by making their dictionaries overly complicated. One indication of this is the need to compile the source DDL into an object DDM before the language can use it.

The extra time required to compile the DDM carries a penalty of one to five minutes, depending on the sophistication of the DBMS. Note that "sophistication" is not a word that one should apply casually.

No more than five minutes should be required to alter a file definition and complete any compilation that may be necessary. In the event that the change cannot be made within an hour, alternative DBMS products should be considered. Either the tools necessary to prototype rapidly are not present, or the DBMS vendor has emphasized product development more than actual production.

If so, the DBMS product will not be responsive to the system's requirements during the crucial first moments. Prototyping will not be possible, and a missed opportunity to resolve errors at the outset will result in a system that is never efficient and always in disrepair.

The second of our initial mandatory assumptions states that however much care was taken, the file will contain some oversights and that mistakes should take no longer to correct than to put in. Further, misadventure and performance issues may be detected at any point before, during and after development. The number of mistakes possible multiplied by the amount of time needed to correct them should total no more than five minutes.

### Initial programs

Relational DBMS and fourth-generation languages allow the computer to recognize the state of being null, a state with which humans deal every day. Data is either present, or it is not. If present, it is correct or not. If incorrect, it is changed. If required and not present, it is changed from not being there (null) to being there. If a field is present when it should not be, it is changed to null.

There is no more add, change and delete logic in the modern computer. Everything is a change. Insitu — Latin for "a change in place" — is the generic name for the logic that replaces the add, change and delete, or "canned," update logic.

The practice of altering or generating a skeleton program is no longer adequate when dealing with a relational DBMS system. The number of possible combinations for keys and values is

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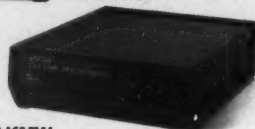
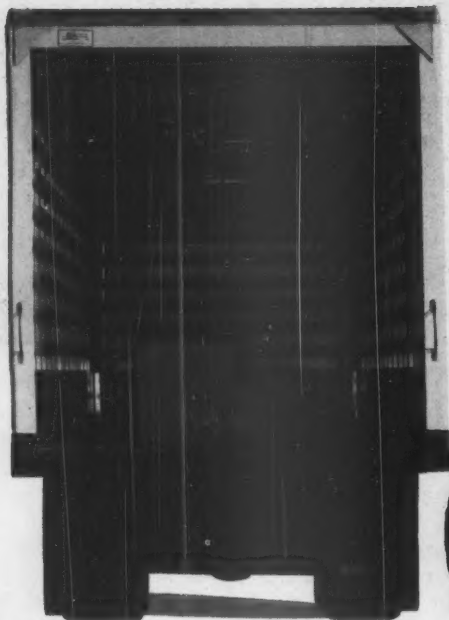


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## In Depth/Two Weeks to a Working Prototype

sufficient to require a compiler to analyze and construct the Insitu program with the assumption that everything described in the DDL is required.

Automatic construction of Insitu logic will take between one and four minutes, depending on the complexity of the file or files and speed of the machine.

At the end of this time, the Insitu program should have been exercised against every file to establish that the following basic operations can be handled in a straightforward manner:

- Create a record. Create another record.
- Retrieve a single record. Then, retrieve several records on any keys.
- Change a record. Verify that the changes took place.
- Delete a record.
- Try to add a duplicate record.
- Try to change the keys of one record to duplicate those of another record.
- Try to remove all keys of a record.

At no time during the process

??

***There is no more add, change and delete logic in the modern computer. Everything is a change.***

should any form of machine error be received. The results should be reviewed to see whether they match the specifications.

For instance, can records be arbitrarily created? Are records actually deleted (this is unlikely), or do specifications call for some form of logical retirement? Are duplicate records permitted?

### Modifying the source code

If these operations can be done without problems, the first iteration of the prototype has just been successfully created. The source code can now be modified to apply the proper legal edits of data contained in a specific field to the process of introducing new records, to make alterations and to retire them.

If a machine error occurs or the legal editing cannot be immediately applied to the file, the file definition contains a contradiction or paradox error and the definition process needs to start over.

If it has taken seven minutes or so to get this far, the next try should be ready in another seven minutes. If you have just called home to tell them you're still working and not to wait supper, you should by now appreciate some of the points about timing made earlier.

### Preparing for the walk-through

The second phase of prototyping is the walk-through. The objective of this phase is not to elicit praise, but to get clients to participate in building the system from this point on so that the developers are not forced to go out on a limb and make decisions that will determine the project's success or failure.

The single most crucial step is to get the system in a form that all of the participants will recognize. Start

by making the order of processing the data conform to the design specifications.

The nicest thing about having the DDL compiled into a source program is that the program will lack the intelligence to make errors of omission. Every field that was specified as a key will appear in the selection screen, while every field will appear on the update screens.

This exercise in removing unwanted fields brings to mind an old Hindu saying: To carve an elephant, you take a large rock and knock away whatever doesn't look like an elephant.

If the designers have used generic names for fields, the result will be a series of screens that are immediately recognizable to end users. To further increase the impact and recognition value, the following work may

be done before conducting the first walk-through:

- Arrange the fields on the screen to resemble existing paperwork. Where appropriate, distribute fields among screens to bring the prototype in line with specifications. Remember to avoid having the same field updated on several screens. Add a few validation tests to dates and ranges to illustrate the method for error detection and correction.

- Build a simple front-end menu that calls the programs in order, again according to the specifications. Compile Exodus, a load program that will bring in live data that users can recognize. Do not forget to scramble sensitive information, and remove any inappropriate test items.

- Assume that any work done prior to the walk-through will be of no further value. Any such investment

that is subsequently retained can be considered a bonus to reward your efforts. Technical investment up to this point has taken less than an afternoon. Further investment in this prototype will not be productive without the benefit of greater expertise.

### Conducting the walk-through

The final part of the first iteration phase of prototyping is to conduct a demonstration for the designated users. Since the objective is to get the users involved from this point on, it is proper to term this the first of many walk-throughs.

The actual procedures of conducting a walk-through are as varied as the participants, but the more effective approach entails having the users operate the prototypes for themselves while the developers take

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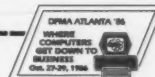
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## In Depth/Two Weeks to a Working Prototype

copious notes.

This can be a good opportunity for introducing the concept of associating cost with benefits. If the DBMS places error messages at the top of a screen, and the end users wonder if the errors could be handled otherwise, it can be discussed in nontechnical, conversational terms. Such a dialogue might start with the developer observing the following:

"If all errors were checked before any were displayed, any errors after the first could be spurious."

"Correct data might be flagged as wrong by the existence of a previous error. The later message would disappear when the initial error is corrected."

"Indication of several errors results in misleading statements to correct data that is already correct. In effect, such error messages will produce errors if followed."

"Errors appearing at the top cost nothing and are supported by the vendor. To reposition error messages from the top of the screen to the bottom or side will take X people Y weeks, months or years at a cost of Z dollars."

#### Opportunities to collaborate

Such discussions of a prototype's inner workings give developers and end users the opportunity to collaborate and form strategies for the rest of the project.

Questionable features can be documented for later discussion or even prototyped in a similar fashion to best determine the worth and expense of several alternatives before

committing to any approach.

In the third phase of prototyping, apply the changes from the walk-throughs and hold another walk-through. If this phase were a recipe, it would read, "Season to taste." With each improvement, the prototype increasingly resembles a finished system.

In fact, if the performance falls within acceptable tolerances under load, the project may be in its final tuning stages. Where an early completion is not foreseen, the system can be refined to the point at which formal production development can take over.

There remain just a few points to be kept in mind as the system is being refined:

- As the walk-throughs progress, omissions and misadventures will emerge in the form of enhancements to the system. Since this is a prototype, developers are not confined to merely working with code. Each change can be made to the most appropriate component. Fields can be

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***Working prototypes have more than a few similarities to actual systems, not the least of which is that they both have become complicated. With good management and standards, the development team should have no problem making the system perform to specifications. The only risk is that the original concept of prototyping might be lost.***

added and changed in a file. Data dictionary and language names can be changed. Source code can be changed as required.

- The key to these operations is to prototype each change as was done from the first: Make the change, generate the file then test the data. In the case of alterations, however, each change is checked out independently to establish that it is sound. With the integrity established, it can then be fit into the working prototype and retested.

In other words, take the seven minutes to establish the file, generate the Insitu and check out the change. Then discard this interim prototype.

#### Almost the real thing

Working prototypes have more than a few similarities to actual systems, not the least of which is that they both have become complicated. With good management and standards, the development team should have no problem making the system

perform to specifications. The only risk of note is that the original concept of prototyping might become lost.

The working prototype will contain special algorithms, edits and screens that have little resemblance to the first programs. Nevertheless, this work must be viewed as the means to an end rather than an investment to be preserved. If a routine is no longer called for, it must be discarded. If a feature is criticized, it must be justified, not defended.

Prototyping is the result of a philosophy that applies to data processing — the true meaning of work from a physical sciences point of view.

In physics, work is defined in Webster's New Collegiate Dictionary as "activity in which one exerts sustained physical or mental effort to achieve an objective or result."

The productivity of the programs and files that result from the prototyping process will appear phenomenal to those who are not accustomed to the process.

In the final evaluation, the prototyping process will have required more actual effort than appears to have taken place. However, personal productivity has been increased because a machine was used to perform what had previously been done by hand.

The speed with which a prototype system can be constructed and adjusted more than offsets the dire business consequences of premature implementation and the cost of overdevelopment without guidance. ■

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# MANAGEMENT



## TAKING CHARGE

Les Gilliam

## What's MIS got to do with it?

**J**ust yesterday it happened again. An MIS director wondered why he must once again justify the existence of his department.

After so many years of incorporating data processing into the mainstream of U.S. business, why is there still a communication gap between top management and the computing function? What are some ways to improve this relationship?

There are no easy answers to these questions that will apply to every situation. But maybe some of the ideas presented below will be helpful in developing a strategy to address the problem.

The MIS director should, of course, develop a good understanding of the business. This is necessary in order to service and support all the various departments or functional areas of the company and to address their data processing needs.

More importantly, it is vital that the computer manager develop a top management viewpoint. He should become acquainted with the management team, get to know them personally and understand their goals for the business and the obstacles they face.

How much do they know about data processing? Do they think of it as a valuable resource or as a necessary evil? Are their expectations too high? Is their only interest in reducing the cost of MIS?

How can the MIS director help management to overcome obstacles and

See **WHAT'S** page 111

Gilliam is a Ponca City, Okla.-based independent consultant

## Market orientation leads to DP profits for Dapsco

By David A. Ludlum

DAYTON, Ohio — At a time when data processing managers everywhere are talking of running their operations like a business, a DP shop here is being run as a business and has been for 15 years.

Dapsco, Inc. provides data processing and other services to wholesale suppliers of products used in plumbing, electrical wiring, heating and air conditioning and electronics.

The firm's objective is clear and simple. "We're in business to make a profit," President Richard Schwartz said.

In describing the means for achieving that goal, Schwartz sounded the same theme information systems gurus have preached to would-be corporate chief information officers. "We go out and try to find out what problems the [client] company is having. We try to help customers grow," he said.

There is more behind this approach than an urge to satisfy the customer. Dapsco bases its charges for ongoing services on the growth of its customers' profits.



Dapsco's Schwartz

The technique appears to have worked. Dapsco's sales have risen from \$500,000 to \$3 million in the last 10 years, while profits have grown steadily at annual rates of 16% to 22%, Schwartz noted.

The company's marketing method, besides some trade show appearances, is through referrals from customers, suppliers and banks, he declared.

Dapsco was founded in 1963 by a group of local financiers to provide accounting services to a handful of plumbing suppliers. Its range of services and clients has grown, with a data processing service added in 1970.

Dapsco now serves 180 customers nationwide. See **MARKET** page 107

## INSIDE

Veto of California systems measure debated/103

Calendar: Selected conferences, exhibitions, seminars/108

## INSTANT ANALYSIS

"Billions of dollars of business investments will rise and fall on the basis of their information management."

— Robert E. Allen, president, AT&T

## Micro managers face the future

### Staffs with burgeoning skills want more from job

By Peggy Watt

LOS ANGELES — After seeing their own jobs change with the arrival of microcomputers, computer center managers are grappling with more changes as users learn to handle the machines.

Some trainees feel computer literacy should bring them a new title and an even bigger paycheck, even though they are novices, according to participants in a panel on the microcomputer's impact on jobs and careers at the recent Corporate Microcomputer Exposition and Technical Conference.

Others noted that executives expect more of employees with computer skills

and that workers' roles sometimes change upon acquiring them.

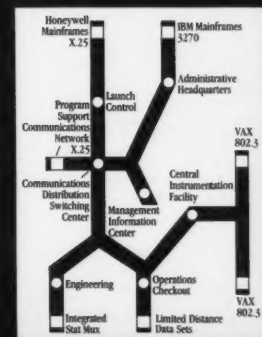
"We have a coup en passant coming. People want money with the new responsibilities they see come with personal computers," said Addie Mattox, president of consulting firm The Mattox Group of Los Angeles, who headed the panel. However, those employees' new skills are often just the beginning of their computer literacy, Mattox noted.

Sharon Campbell, president of the consulting group Microtec, said executives often expect more of workers with personal computers. "They seem to almost feel the machine does the work," she said.

Mattox said she sees changes in work roles among employees with new computer literacy. "People who have become microcomputer managers are asking things of

See **MICROS** page 107

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## MANAGEMENT

# Critics cite special interests in California telecom bill veto

## Reject governor's fiscal grounds as inaccurate

By Jeffrey Beeler

SACRAMENTO, Calif. — Critics have denounced California Gov. George Deukmejian's veto of legislation that would have unified several of the state's systems and telecommunications agencies under one central authority as a setback for government users.

In a recent veto message, Deukmejian defended his opposition to Assembly Bill 808 primarily on fiscal grounds. The state legislature, he said, had neglected to allocate the necessary \$3.3 million to make the proposed law a reality.

But the author of the bill, state Assemblywoman Gwen Moore (D-Los Angeles), rejected Deukmejian's estimates as excessively high and placed the projected costs instead at just \$100,000.

Moreover, she added, whatever savings the veto might yield in the short run will be more than offset by the long-term cost of Deukmejian's failure to correct flaws in California's existing approach to technology management.

Inefficiencies in that approach will cost the state hundreds of millions of dollars in the form of hampered user productivity and lost opportunities for technological solutions, Moore said.

Moore's principal legislative consultant, Bob Jacobson, dismissed Deukmejian's stated reasons for killing A.B. 808 as a ruse calculated to obscure the purely political motives for which opponents wanted the legislation scuttled.

Jacobson said he blames the bill's defeat partly on an intense lobbying campaign by the small cadre of powerful vendors that enjoy what he called a virtual lock hold on the state's telecommunications and systems acquisitions. Passage of the legislation, he said, would have led to a bureaucratic reorganization that might have seriously jeopardized the firms' long-standing relationships with key state customers.

The bill's downfall also resulted from certain state officials' concerns that enactment of the law would shrink the scope of their departments' activities and thus diminish their own personal authority, Jacobson said.

Asked to respond to Jacobson's comments, Deukmejian's assistant press secretary, Donna Lipper, reiterated the veto message's theme that the governor's objection to A.B. 808 was strictly budgetary. Lipper denied claims that pressure from special interests contributed to the bill's death.

Also disputing Jacobson's remarks about the legislation was Marty Walton, a policy analyst with California's State and Consumer Services Agency. Like Shirley Chilton, the agency's head, Walton opposed the bill on the grounds that "it was unnecessary and wouldn't allow us to do anything with technology management that we can't already do through existing state organizations."

But Walton's views on the subject differ sharply from those of Tom

West, MIS director for the California State University system. When informed of Deukmejian's veto, West voiced disappointment but not surprise.

"I wish the legislation had passed," West said. "It would have raised the state's consciousness about the importance of telecommunications in transacting official business and would have enhanced the government's ability to deal effectively with the technology."

Introduced in January 1985, the bill proposed the consolidation of several existing state offices and agencies to form a new government organization called the Department of Telecommunications and Informa-

tion Resources Management.

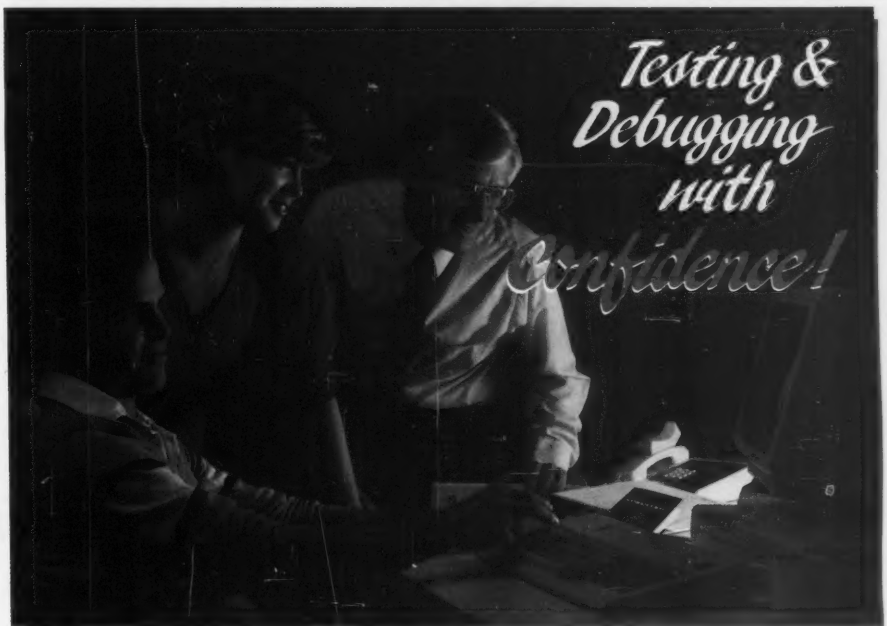
Although the legislation left details of the proposed unification unspecified, it was widely expected to base the new department on two main components — the state's Office of Information Technology (OIT) and Office of Telecommunications (OT). Implementation of the bill would have necessitated the merger of the OIT and the OT, which currently belong to the state's Department of Finance and Department of General Services, respectively.

In urging the reorganization, A.B. 808's underlying intent was to centralize the process by which the state government identifies its opportunities for automation and picks the

best technological solutions from among the various commercial options, Jacobson said.

At present, the state's procedure for procuring new technology is highly fragmented, with each office or agency doing the job independently of all the others. The result, Jacobson said, is that, often, users never learn of many potentially useful technologies because vendors must approach each bureaucratic entity individually to make their products known.

Had A.B. 808 been signed into law, it would have created a central contact point both for vendors seeking to pitch their wares and for users desiring technical guidance, he added.



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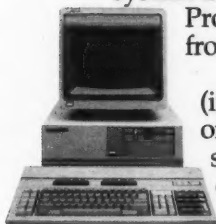


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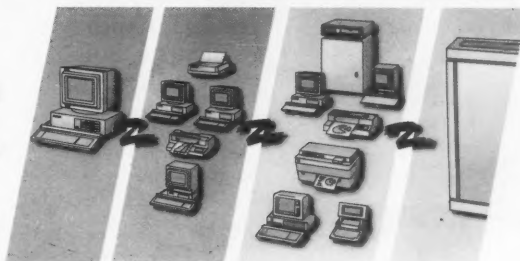
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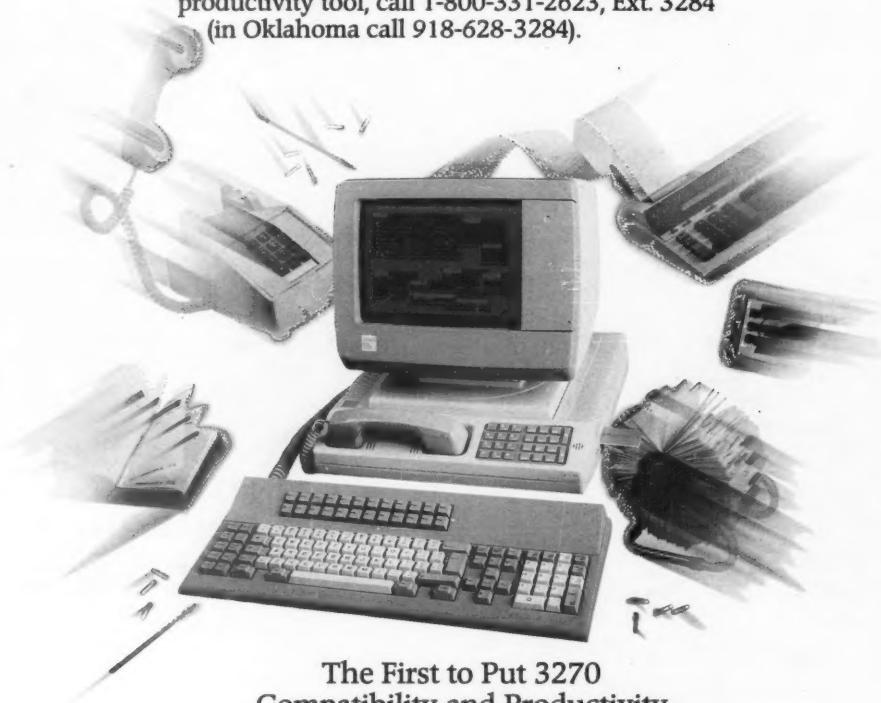
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TELEX COMPUTER PRODUCTS, INC.



## MANAGEMENT

## Market-oriented Dapsco profits

From page 101

tionwide through six regional offices, offering help with accounting, cash management, centralized purchasing and data processing. "We've put together a complementary set of services attractive to one market," Schwartz said.

Now data processing is "the glue that holds all the services together," he added. DP services include order entry and inventory control, accounts receivable, financial reporting, accounts payable and payroll.

Dapsco has 86 employees, including six full-time programmers.

Schwartz says its chief data pro-

cessing challenges are keeping development costs low through time-saving fourth-generation languages, maintaining programming standards to ensure that code is easily maintainable and finding lower-cost ways to extend computing power to its offices.

### Runs IBM mainframe

The company headquarters has a IBM 4361 Model 5 mainframe under DOS/VSE and CICS. Client input and output is routed through IBM 3274 and 3174 terminal control units in the regional offices, which are linked to the Dayton office through leased lines.

Dapsco is a value-added dealer for IBM's System 36 Personal Computer, which it sells to clients. Some of those that have not received a System 36 are on-line with CICS, others

use dial-up systems.

The System 36s will generally lower clients' costs and increase their capabilities, providing a larger distributed data base, for example, Schwartz said.

"For the average-size customer it has proved to increase profitability through better control of inventory and receivables," according to Schwartz.

### Cobol, RPG II code

Dapsco's programmers write most of their code in Cobol or RPG II, a report-generating language. "We've been extensively using fourth-generation languages to keep costs down and respond quickly and reduce maintenance costs," Schwartz noted.

For five months Dapsco has been an alpha- and beta-test site for Goal Systems International, Inc.'s Quik-

task, a Cobol-like interactive fourth-generation language. "You've got to be test site to stay ahead of the game," Schwartz maintained.

### 'Efficiency the key'

"The efficiency of the programming development and of the programming staff is key to our profitability. Unlike a corporate information center, we can't absorb low productivity by billing out overhead to the rest of the organization, because there isn't any," he claimed.

The company also pushes efficiency on the personnel side. "A lot of employees own stock and have incentive to see the company grow," Schwartz said.

"They're a traditionally overhead-type staff, but they all work together because they're no longer overhead, they're a profit center."

## Micro managers face the future

From page 101

people they didn't deal with before," she said. For example, subordinates ask supervisors for financial figures because the supervisors use a spreadsheet. The worker monitoring project management software wants reports on where participants sit on the computerized time line.

Despite perceived benefits, resistance to the acquisition of computer skills still exists, said Judy Gilbert, a user consultant for the office automation information center at Pasadena City College. Some users still avoid computers, she added, and some managers argue, "How can I let my secretary take all that time to go to class?"

77

*'What we're seeing is a company saying, "We're paying to train you, we sent you to the classes, we gave you new skills and made you more marketable. You want more money? We want return on our investment."'*

— James E. Smith

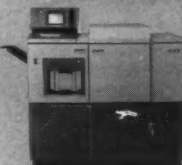
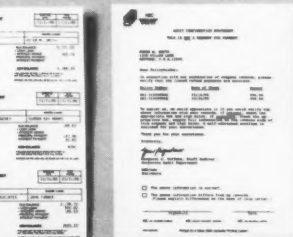
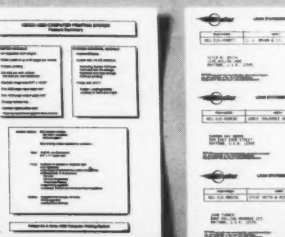
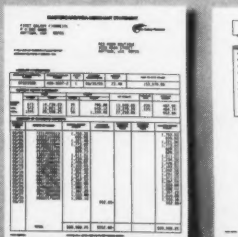
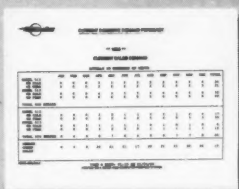
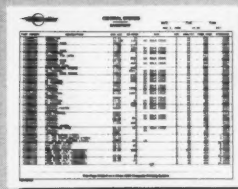
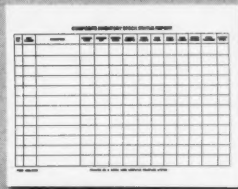
Security Pacific Computer Solutions, Inc.

The philosophy at Security Pacific Computer Solutions, Inc., the Security Pacific Corp. information center that took on a life of its own, is that the employer who trained employees should benefit from the employees' new skills, said James E. Smith, president of the information center.

"What we're seeing is a company saying, 'We're paying to train you, we sent you to the classes, we gave you new skills and made you more marketable. You want more money? We want return on our investment.'"

Smith said. Security Pacific got a return on its own investment by expanding its information center to offer training and other services to companies.

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## MANAGEMENT



## CALENDAR

## OCTOBER 19-25

**Central Prime Users Group Ninth Annual Meeting.** Chicago, Oct. 19-21 — Contact: Deborah Morby, Computronics, 4N165 Wood Dale Road, Addison, Ill. 60101.

**Eighth Annual Conference on Intelligent Copier/Printers.** Monterey, Calif., Oct. 19-21 — Contact: Gail Montgomery, Conference Registrar, Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

**Technetron '86.** Boston, Oct. 19-22 — Contact: Wang Laboratories, Inc., Mail Stop 1935, One Industrial Ave., Lowell, Mass. 01851.

**Third-Party and Self Maintenance Conference.** New York, Oct. 20-21 — Contact: Frost & Sullivan, Inc., Department RE-828 E, 106 Fulton St., New York, N.Y. 10038.

**Index '86.** Boston, Oct. 20-22 — Contact: Bunny Wing-Fernhall, Executive Director, Wang Users Society of America, P.O. Box 174, De Kalb, Ill. 60115.

**Unixexpo.** New York, Oct. 20-22 — Contact: National Expositions Co., Suite 12A, 49 W. 38th St., New York, N.Y. 10018.

**Informatics '86.** Toronto, Oct. 20-23 — Contact: International Information Management Congress, P.O. Box 34404, Bethesda, Md. 20817.

**American Production and Inventory Control Society 29th Annual International Conference and Technical Exhibit.** St. Louis, Oct. 20-24 — Contact: APICS, 500 W. Annandale Road, Falls Church, Va. 22046.

**Electronic Linkage of International Markets.** New York, Oct. 21 — Contact: Waters Information Services, Inc., P.O. Box 2248, Binghamton, N.Y. 13902.

**International Symposium on Methodologies for Intelligent Systems.** Knoxville, Tenn., Oct. 21-25 — Contact: University of Tennessee, Department of Conferences, 2014 Lake Ave., Knoxville, Tenn. 37996.

**Software Configuration Management and Software Quality Assurance.** Santa Maria, Calif., Oct. 22-24 — Contact: Software Certification Institute, P.O. Box 2328, Santa Maria, Calif. 93455.

**Tenth Annual Data Entry Management Association Conference and Equipment Exposition.** Las Vegas, Oct. 22-24 — Contact: DEMA, 750 Summer St., Stamford, Conn. 06901.

**International Computers & Communications 1986-2000.** Washington, D.C., Oct. 22-25 — Contact: IC&C, P.O. Box 17392, Washington, D.C. 20041.

**Software Quality Assurance.** Toronto, Oct. 23 — Contact: American Society for Quality Control, P.O. Box 340, Station A, Scarborough, Ontario, Canada, M1K5C1.

**Worldwide Market Opportunities.** San Francisco, Oct. 23-24 — Contact: Jack Hart, International Data Corp., 5 Speen St., Framingham, Mass. 01760.

**Annual Human Resources Conference.** New York, Oct. 23-24 — Contact: The Conference Board, Inc., P.O. Box 4026, Church Street Station, New York, N.Y. 10249.

**Seventh Annual Computer Law Institute.** New York, Oct. 23-24 — Contact: Mary Kilroy, Law & Business, 855 Valley Road, Clifton, N.J. 07013.

**IFMA '86.** Chicago, Oct. 26-29 — Contact: International Facility Management Association, Suite 1410, Summit Tower, 11 Greenway Plaza, Houston, Texas 77046.

## OCT. 26-NOV. 1

**Digital Document Automation: The Emerging User.** Reston, Va., Oct. 26-28 — Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

**American Trucking Association Fall Workshop and Systems Demonstrations.** New Orleans, Oct. 26-29 —

Contact: ATA Management Systems Department, 2200 Mill Road, Alexandria, Va. 22314.

**International Data Corp.'s MIS Executive Conference.** Palm Springs, Calif., Oct. 26-29 — Contact: IDC, 5 Speen St., Framingham, Mass. 01701.

**Fifth World Congress on Medical Informatics.** Washington, D.C., Oct. 26-30 — Contact: George Washington University Medical Center, Office of Continuing Medical Education, 2300 K St. N.W., Washington, D.C. 20037.

**The State of the Art in Computer Capacity Management.** Tarrytown, N.Y., Oct. 27 — Contact: International Systems Services Corp., 41st Floor, Two Grand Central Tower, 140 E. 45th St., New York, N.Y. 10164.

**Annual Teleconferencing Users Conference.** Anaheim, Calif., Oct. 27-29 — Contact: Applied Business

Telecommunications, Box 5106, San Ramon, Calif. 94583.

**Data Processing Management Association Annual Computer Conference and Business Exposition.** Atlanta, Oct. 27-29 — Contact: Conference and Meetings Manager, DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.

**Hammer Forum '86.** Cambridge, Mass., Oct. 27-29 — Contact: Hammer and Co., Five Cambridge Center, Cambridge, Mass. 02142.

**Optimizing Software Productivity and Quality.** Arlington, Va., Oct. 27-29 — Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

**National Database and 4th Generation Language Symposium.** Dallas, Oct. 27-30 — Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

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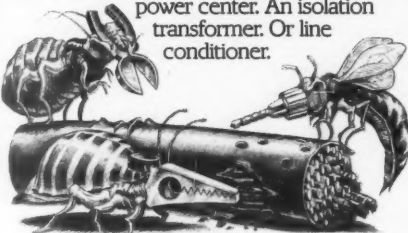
As Bell Labs reports in a major study of 24 computer sites, motor-generators solved 96 percent of their power line problems.

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sets to full UPS systems, both static and rotary. Emergency Power Engineering, Inc. EPE, for short.

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## MANAGEMENT

**Satech '86.** Boston, Oct. 27-31 — Contact: 2472 Eastman Ave., No. 34, Ventura, Calif. 93003.

**Token-Ring Vendor Forum.** San Jose, Calif., Oct. 29 — Contact: Network Strategies Group, 1435 Koll Circle, San Jose, Calif. 95112.

**Distribution Computer Expo '86.** East Parsippany, N.J., Oct. 29-30 — Contact: C. S. Report, Inc., P.O. Box 453, Exton, Pa. 19341.

**Applications of Artificial Intelligence and Expert Systems.** Arlington, Va., Oct. 29-31 — Contact: Learning Technology Institute, 50 Culpeper St., Warrenton, Va. 22186.

**Association of Public Data Users 11th Annual Conference.** Washington, D.C., Oct. 29-31 — Contact: Susan Anderson, APDU, 87 Prospect Ave., Princeton, N.J. 08544.

**2nd Annual Pansophic Users Learning & Sharing Exchange**

**(PULSE).** King of Prussia, Pa., Oct. 30 — Contact: Regional Administrator, Pansophic Systems, Inc., Suite 103, 485 Devon Park Drive, Wayne, Pa. 19087.

**Telecommunications and the Computer Connection.** White Plains, N.Y., Oct. 30-31 — Contact: Pace University, Bedford Road, Pleasantville, N.Y. 10570.

**Computer Dealers and Lessors Association Annual Meeting.** Colorado Springs, Colo., Oct. 30 to Nov. 1 — Contact: CDLA, 1212 Potomac St. N.W., Washington, D.C. 20007.

**The End-User Revolution.** San Francisco, Oct. 31 — Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

**UCSD Pascal Users Society Biannual Meeting.** Greenwich, Conn., Nov. 1-3 — Contact: Software Sys-

tems, Inc., 1410 39th St., Brooklyn, N.Y. 11218.

## NOVEMBER 2-8

**ADAPSO 65th Management Conference.** Phoenix, Nov. 2-5 — Contact: ADAPSO Education Dept., Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

**1986 NAWGA Computer Conference and Expo.** Atlanta, Nov. 2-5 — Contact: National-American Wholesale Grocers' Association, 201 Park Washington Court, Falls Church, Va. 22046.

**Fall Joint Computer Conference '86.** Dallas, Nov. 2-6 — Contact: Stanley Winkler, FJCC '86, 1730 Massachusetts Ave. N.W., Washington, D.C. 20036.

**Managing the Information Re-**

**source.** Los Angeles, Nov. 2-7 — Contact: Office of Executive Education, Graduate School of Management, University of California, Los Angeles, Calif. 90024.

**Disoss Implementation.** Washington, D.C., Nov. 3-4 — Contact: The Georgetown Group, Inc., Moore-McCandlish House, 3950 Chain Bridge Road, Fairfax City, Va. 22030. Also being held Nov. 5-6 in Washington, D.C. and Dec. 8-9 and 10-11 in New York.

**Automated Manufacturing Exhibition and Conference.** Greenville, S.C., Nov. 3-6 — Contact: Allen F. Barney, AM86, P.O. Box 5616, Greenville, S.C. 29606.

**Electronic Imaging '86.** Boston, Nov. 3-6 — Contact: MG Expositions Group, 1050 Commonwealth Ave., Boston, Mass. 02215.

**Long Range Information Systems Planning.** Washington, D.C., Nov. 3-6 — Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

**Advancing Standards Technology for Distributed Information and Telecommunications Systems.** Boston, Nov. 3-7 — Contact: Omnicom, Inc., Suite 304, 501 Church St. N.E., Vienna, Va. 22180. Also being held Dec. 15-19 in Denver.

**Corporate Electronic Publishing.** Saddlebrook, N.J., Nov. 4 — Contact: Text Corporation, 37 Broadway, Arlington, Mass. 02174. Also being held Nov. 5 in Atlanta, Nov. 6 in Chicago and Nov. 7 in Seattle.

**North American Telecommunications Association Convention & Exhibition Showcase.** St. Louis, Nov. 5-7 — Contact: NATA, Suite 550, 2000 M St. N.W., Washington, D.C. 20036.

**Scientific Computing & Automation Conference and Exposition.** Atlantic City, Nov. 5-7 — Contact: Expocon Management Associates, Inc., 3695 Post Road, Southport, Conn. 06490.

**Second Annual Conference on Optical Storage for Small Systems.** Los Angeles, Nov. 5-7 — Contact: Technology Opportunity Conference, 256 Laguna Honda Blvd., San Francisco, Calif. 94116.

**Second Annual Software Management Strategies Conference.** Toronto, Nov. 6-7 — Contact: Gartner Group, Inc., 72 Cummings Point Road, Stamford, Conn. 06902.

## NOVEMBER 9-15

**Information Industry Association 18th Annual Convention & Exhibition.** New York, Nov. 9-12 — Contact: IIA, Suite 800, 555 New Jersey Ave. N.W., Washington, D.C. 20001.

**Information Center Implementations: Real Issues.** New York, Nov. 10 — Contact: Atrre International Consultants, Inc., P.O. Box 727, 16 Elm Place, Rye, N.Y. 10580.

**Association for the Development of Computer-Based Instructional Systems Annual Conference.** Crystal City, Va., Nov. 10-13 — Contact: ADCIS, Room 409, Miller Hall, Western Washington University, Bellingham, Wash. 98225.

**Comdex/Fall '86.** Las Vegas, Nov. 10-14 — Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194.

**T-1 and SDN: Seizing Economic Control of the Network.** Nov. 11-12, New York — Contact: The Yankee Group, Seminar Division, 14th Floor, 89 Broad St., Boston, Mass. 02110.

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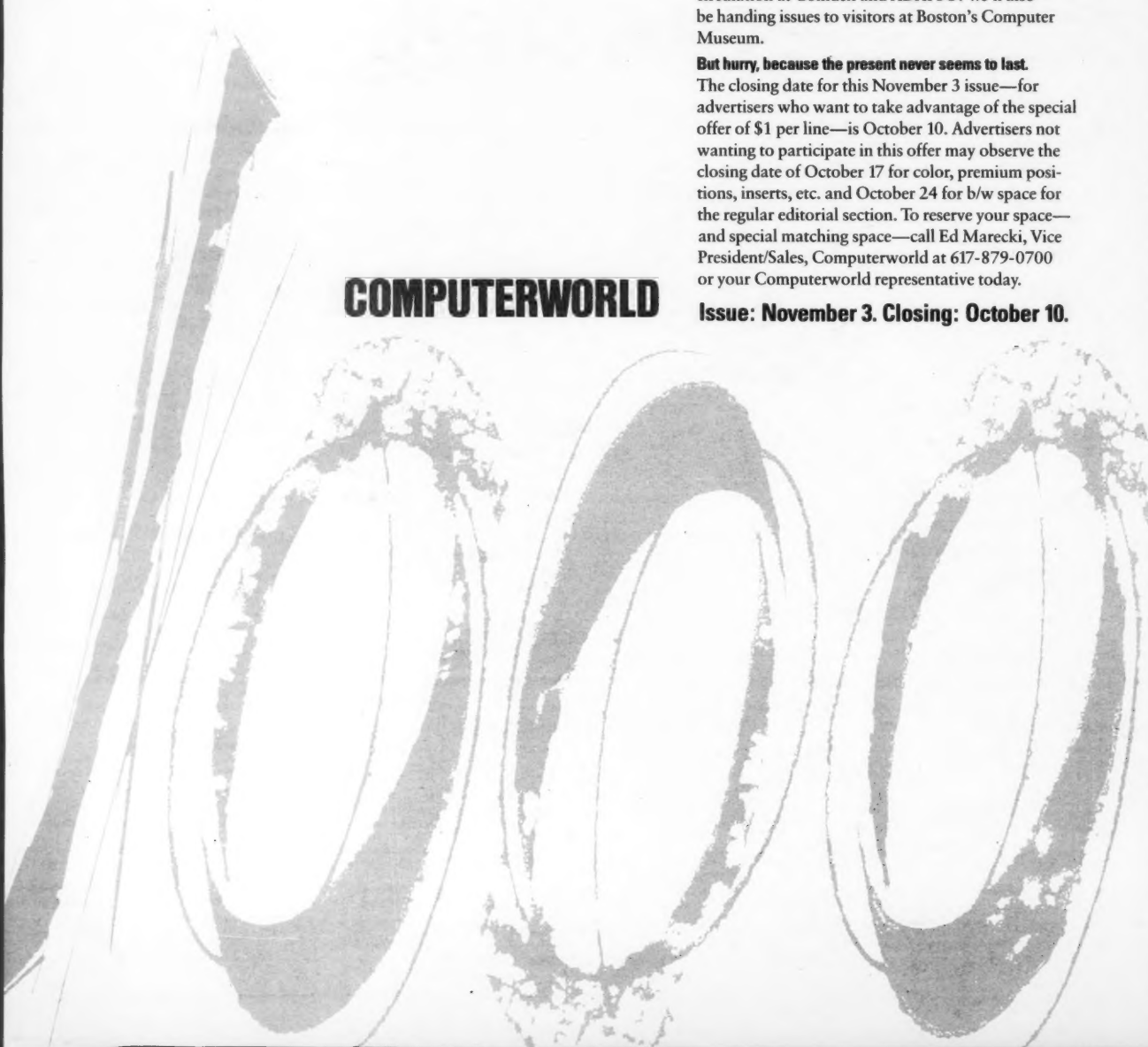
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**Issue: November 3. Closing: October 10.**





## MANAGEMENT

## What's MIS got to do with it?

From page 101

move toward their goals?

Before going on the attack to set top management straight, the MIS director would do well to make sure his own house is in order. What are his significant accomplishments? Is he providing satisfactory services at competitive costs?

The MIS director must also ask himself if he is looking ahead to anticipate the future needs of the users. Are the budget, staff and work load organized along the lines of new projects, maintenance, research, support and processing?

Knowing the answers to these questions is necessary in order to explain how the company's funds are being used and why it is impossible to respond to every request immediately and to present an understandable picture of the various services being provided by MIS.

### Priorities

Does the MIS director place a high priority on communicating with management or does he assume they will ask if they want to know? The smart director will develop ways to

and MIS's ability to meet all the company's needs within existing constraints. Without question, well-written work plans, progress reports, postaudit reports and cost/benefit analyses are valuable in contributing to this education process.

Quite likely, upper management's opinion of MIS's value will be affected by the opinions expressed by users. Therefore, it is imperative that user departments receive the service and support they need in order to sing the praises of DP.

### Steering committee

One technique often employed is that of a steering committee. This committee should be composed of managers from various areas of the company, should participate in the planning and budgeting process, should be kept informed of accom-

plishments and should have the ear of upper management.

Getting the full support of such an influential group of upper-level managers will go a long way toward bringing the MIS department the recognition it deserves.

If a serious communication gap persists, a face-to-face session with the chief executive may be the answer. A well-prepared presentation of MIS's responsibilities and recent accomplishments, stated in business-like terms, is appropriate. Explaining the system development methodology and its value may help clear up the reasons that projects "take so long."

### Reviewing disaster plan

Reviewing the MIS plan for disaster recovery will illustrate why MIS should be considered a vital and

mainline function within the company.

If costs are an issue, maybe a comparison of present MIS costs with the industry average, or with another company's data processing costs, would be an eye-opener for the chief executive.

By all means line up some testimonials from user departments whose functions and value the chief executive *does* understand. In any case, find out the chief executive's main concerns and address these directly until a satisfactory solution is found.

Finally, keep this in mind: Every chief executive wants to brag about something, and a prime candidate is what his computer system has done for the company. The opportunity is there. The wise MIS director will seize the opportunity and respond accordingly.

”

**Every chief executive wants to brag about something; a prime candidate is what his computer system has done for the company. The wise MIS director will seize the opportunity and respond accordingly.**

spread the word, in a positive and unselfish manner, on how the user departments have improved the bottom line, cut expenses, improved productivity or enhanced their information use with the assistance of MIS.

Does the MIS director operate with a bottom-line orientation? Does he develop the budget and work plans considering their short- and long-range effects on the company's revenue, expenses and profits? Are there opportunities to produce a marketable product or service out of data processing, as American Airlines did with its reservation system?

In short, does the MIS director consider himself a caretaker or a contributor?

### Understanding MIS

If top management is to be able to properly relate to MIS, it must have an understanding of and appreciation for the complexity of the MIS function and be able to see the potential of that department. Some vendors offer seminars that aid upper management executives in improving their knowledge of the data processing function.

Consultants can sometimes be of value in addressing the gap between upper management's expectations



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So pick up your phone (assuming it still works) and call Transtector now to receive a complete package of information on "How To Solve Power Line Problems Without Playing Games."

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**TRANSTECTOR® SYSTEMS**

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So the MIS executive asked,  
“How do I get departmental systems  
that keep everyone happy?  
Including me.”





## And we said, “That’s our department.”

With Honeywell’s ONE (Office Network Exchange) PLUS Departmental Systems, computer pros and department heads together can make fully integrated departmental computing a reality. And at the same time protect their present investment in WANG and IBM systems – by tying them together through ONE PLUS’s communications capabilities. ONE PLUS also supports IBM’s SNA. Honeywell’s ISO-based DSA. Ethernet. MAP and TOP protocols. DMI interfaces to AT&T PBX’s.

Much more than communications, ONE PLUS provides business applications like office and data processing. Transaction Processing. Business Graphics. Electronic Mail. Document Translation. Plus access to islands of computing through data

base tools such as ORACLE\*\* and ONEbase.

Through ONE PLUS’s unique document translator, all your systems can share information in their native format: Users can create, revise and transfer files among IBM and compatible PC’s using Multimate, Wordstar and Displaywrite; WANG OIS and VS systems; and Honeywell.

The heart of ONE PLUS is Honeywell’s new DPS 6 PLUS family of 32-bit virtual memory superminis. With shadow processing and tightly coupled multiprocessor architecture, these systems are more than a match for IBM’s System 36, WANG’s VS, Data General’s Eclipse MV, and Digital’s VAX.

For more information, call 1-800-328-5111, ext. 9712 or write Honeywell Information Systems, MS440, 200 Smith Street, Waltham, MA 02154.

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# Honeywell

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# VMMONITOR... "AUTO PILOT" INSTRUMENTATION FOR YOUR VM SYSTEM



Some VM Data Centers today are "flying blind" when it comes to tuning and monitoring the performance of their VM systems.

And unfortunately, the result can be catastrophic... CPU is saturated, users clash for resources, and bottlenecks occur at peak times.

But now there's VMMONITOR.

## VMMONITOR'S "AUTOPILOT" FOR YOUR SYSTEM

VMMONITOR's unique System Automatic Monitor (SAM) warns your systems personnel of potential problems *before* approaching the critical stage. SAM will advise you of remedies, or even take corrective action on its own.

With SAM on autopilot, you'll experience smooth navigation through minidisk I/O load balancing, resource allocation for compute-bound users, and threshold monitoring.

## ACCURATE MONITORING IN THE REAL-TIME WORLD

When your system has performance problems, new and faster hardware is

not always the answer. And performance analysts with the expertise to tune the system have become scarce.

Until now, your only other solution was specialized software that often ends up sitting on the shelf because it is too difficult to learn.

Both are very expensive propositions. But now there is VMMONITOR.

VMMONITOR accurately evaluates the current status of your system, reports on the essential CP variables, and recommends specific actions to improve VM performance.

VMMONITOR can save its cost many times over by dealing with inefficiencies instead of just throwing more hardware at the problem.

## FULL INSTRUMENTATION VERSUS "IDIOT LIGHTS"

The hectic environment of a busy Data Center is no place for imprecise, and sometimes contradictory, information.

VMMONITOR gives you instant and easily-understood full-screen graphic representations, menus, and displays to identify problems before they become

disasters. VMMONITOR can be used with your color or monochrome terminals.

## CLEAR MANAGEMENT REPORTING, TOO

VMMONITOR gives you graphic summaries, or detailed reports—all available on demand so you get the information you need when you need it.

## A SPECIAL INTRODUCTORY OFFER THROUGH OCTOBER 31

VMMONITOR is regularly priced at \$9,000. But until October 31, you can get VMMONITOR for the introductory price of \$7,000. And if you are a VMCENTER customer, be sure to ask about the special discount for you.

To order VMMONITOR at the introductory price, and with a 30-day trial period, phone:

**800-562-7100**

703-264-8000 in  
Virginia and outside  
the continental U.S.

**VM**  
SOFTWARE INC.

**VMMONITOR FROM VM SOFTWARE, INC. ... THE VM EXPERTS**

1-CWX-861013

Subsidiaries: VM Software (UK) Ltd., Reading, Berkshire, UK, Telex 851849921; VM Software GmbH, Frankfurt, W. Germany, Telex 841411204.



# NEW PRODUCTS

## Case 4600/VS variable speed modems debut

Case Communications, Inc. of Columbia, Md., has introduced the 4600/VS family of variable speed, V.22 bis-compatible modems.

The family consists of the 4624/VS, the 4648/VS and the 4696/VS. According to the vendor, the modems' variable speed capability allows them to adapt to a variety of line conditions, making them compatible with a wide range of communications equipment. They are able to provide either synchronous or asynchronous data transmission.

The 4624/VS transmits data at 2,400 bit/sec. with fallback rates of 1,200 and 300 bit/sec. It operates as a full- or half-duplex modem and incorporates Microcom Networking Protocol (MNP) Class 4 technology that monitors phone lines for noise and interference.

The 4648/VS error-correcting modems incorporate MNP Class 5 technology that offers data compression. The 4648/VS allows data transfer at rates up to 4.8K bit/sec.

The 4696/VS incorporates MNP Class 6 technology, which is said to allow accurate data throughput at speeds up to 19.2K bit/sec. over dial-up telephone lines. The 4696/VS automatically determines other modems' transmission compatibility during the initial connection and then sends data at mutually acceptable speeds, the vendor stated.

The VS modems can communicate with modems that support MNP as well as standard CCITT V.22 bis, AT&T 212A and AT&T 103 modems. They are compatible with Hayes Microcomputer Products, Inc. and Microcom, Inc. command sets.

The 4624/VS sells for \$745; the 4648/VS sells for \$895; and the 4696/VS costs \$1,795.

Case also introduced card versions of each product as well as the RM4600 Rack Mount, designed to house up to eight modem cards that may be mixed in any combination.

The RM4600 is priced at \$845, according to the vendor.

## AI tool offers DB2 access

Artificial Intelligence Corp. of Waltham, Mass., has announced an artificial intelligence software product designed to provide conversational English access to information in large corporate data bases.

Called Intellect/DB2, the product is said to be the first commercially available product that makes true natural language query and data base building available through the use of AI with IBM's DB2 data base management system.

According to a company spokesman, the software uses AI technology to provide corporate management with the tools for natural language information access, ad hoc analysis, application building and proper DB2 use as well as an open system architecture.

The system is said to learn new words

and concepts interactively. Its ad hoc analysis capability answers complex questions in either summary or graphic form without requiring knowledge of the data base structure.

Within regular DB2 security constraints, users can build personal applications, create and update tables, build forms for data presentation and create custom reports.

Intellect/DB2 is a generator of IBM's SQL, so it uses all DB2 facilities including security, catalogs and indexes.

The system's open architecture includes a personal computer link allowing users to access non-DB2 software.

Intellect/DB2 runs under MVS/TSO and is priced at \$95,000, according to the vendor.

## Screen image added to Fax

Xerox Corp. of Rochester, N.Y., has added the Image on Screen feature to its Xerox Faxmaster software.

Faxmaster automates the distribution of information among networked facsimile terminals. Residing on a Xerox 6065 or IBM Personal Computer AT directly connected to a Xerox Telecopier 495-1 Facsimile Terminal, it enables ASCII-to-facsimile data conversion. The Image on Screen feature is said to allow users to view incoming facsimile transmissions on a CRT screen and selectively print pages.

With the Image on Screen feature, a Faxmaster user can view documents scanned into the central facsimile terminal before they are sent out. The user can also view documents scanned from remote facsimile terminals when they are received at the central station, according to the vendor.

The Image on Screen feature will be delivered free of charge to current Faxmaster users and is available to new users as part of the Faxmaster package.

The Faxmaster software is priced at \$695.

## Mitel digital PBX SX-200 switch out for cost routing

Targeting the low-end, digital private branch exchange market that saw introductions from Rolm Corp. and AT&T this past summer, Mitel Corp. of Kanata, Ont., recently announced a digital version of its analog SX-200 switch.

The switch is said to perform least-cost route selection for up to six different carriers and 18 time zone adjustments. It was designed to conform to the evolving Integrated Services Digital Network (ISDN) standard, the company said. The Superset 3DN and Superset 4DN data sets, to be released at a future date, will support the ISDN basic interface that specifies two 64K bit/sec. data channels and one 16K bit/sec. signaling channel.

The data sets will feature six programmable function keys and support asynchronous transmission at rates of up to 19.2K bit/sec., Mitel claimed.

The digital SX-200 reportedly supports between 150 and 250 lines and up to 156 trunks. Prices range from \$430 to \$620 per line, depending on configuration.

### INSIDE

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**IBM**  
printf("Hello, world\n");

### Meet the Industry's New Standard for Mainframe C Compilers

SAS Institute Inc. announces a mainframe version of the Lattice® C compiler—your key to truly portable applications.

With our compiler, you can develop C programs on IBM 370 machines, interface easily with non-C programs and software packages, and protect

your programming investment across operating environments. Virtually every new computer supports C, and portable programs created with the mainframe compiler under OS or CMS will run on any other machine with a C compiler.

The mainframe compiler uses standard IBM linkage conventions. Assembler programs, MAIN routines in other high-level languages, and packages such as IBM's ISPF and GDDM can be invoked directly from C.

And you can use C, instead of assembler, to develop small and fast subroutines called from other languages.

We designed the compiler listing and cross-reference to make programs easy to follow and errors easy to find. An extensive library offers functions from Kernighan and Ritchie and the Lattice PC C compiler. The run-time library produces explicit numbered error messages and a traceback of active function calls if an error occurs.

For all the facts—including details on economical annual licensing complete with free technical support and enhancements—call your Software Sales Representative today.

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(919) 467-8000 Telex 802505



## NEW PRODUCTS/SOFTWARE &amp; SERVICES

SOFTWARE  
& SERVICES

## Systems software

**Symbolics, Inc.** has announced its **Scope System**, a symbolic processing environment integrated with a graphics-optimized dedicated processor.

Scope System consists of the Symbolics 3675, Symbolics' Genera 7.0 software environment and the Pixar Image computer to produce an intelligent image-processing and image-synthesis workstation. The Pixar Image computer is a pixel-based programmable computer that generates and manipulates large digital images. It reportedly processes high-resolution picture data at 40 million instructions per second.

Available in October, the Scope System will cost \$299,900. Symbolics, Graphics Division, Third Floor, 1401 Westwood Blvd., Los Angeles, Calif. 90024.

**Version 3.2 of the Application Factory** for Digital Equipment Corp. VAX/VMS computers has been released by **Cortex Corp.**

Application Factory is an integrated application development and maintenance environment that automatically generates multiuser information processing applications directly from specifications.

Version 3.2 includes a query facility that works with generated applications to provide a syntax-free data query and reporting environment that uses context-sensitive pop-up

menus and is integrated with the Application Factory data dictionary.

Version 3.2 costs \$42,000 to \$150,000.

Cortex, 128 Technology Center, Waltham, Mass. 02254.

**Phase Linear Systems, Inc.** has announced **Plisort OS**, the company's sort/merge system for IBM mainframes that runs under any of the OS operating systems.

Plisort OS is said to improve system efficiency by reducing the resources normally expended in sort/merge operations. It includes all standard OS sort/merge features and uses standard OS sort/merge syntax. Maxsort is provided for sorting large files with limited disk space, the vendor said. Plisort OS also includes data and

file management tools.

Available this month, Plisort OS costs \$3,000 per year for a three-year period.

Phase Linear Systems, International Square, 1850 K St. N.W., Washington, D.C. 20006.

**Tangram Systems Corp.** has released **Version 1.2 of Arbiter**, a VTAM-based cooperative processing subsystem that integrates microcomputers and mainframes.

Arbiter features remote virtual disks that provide unlimited disk resources on mainframe direct-access and storage devices that can be accessed transparently with IBM PC-DOS commands and interactive or batch transfers in both directions, directly or via remote virtual disks.

Arbiter costs from \$12,500 to \$35,000, depending on configuration, and runs on IBM mainframes running under the MVS environment.

Tangram Systems, P.O. Box 5069, Cary, N.C. 27511.

**Genesys Software Systems, Inc.** has announced its **Defined Contributions System**.

The Defined Contributions System reportedly organizes the process of tracking activities including accepting data on employer and employee contributions; allocating investment income; permitting and noting transfers from one investment to another; and summarizing activity for government reporting.

System features include on-line participant information, unlimited transfers among accounts, pay records and unlimited updates or changes to account contributions.

Defined Contributions System runs on IBM mainframes and is priced from \$62,500 to \$250,000.

Genesys Software Systems, 20 Ballard Way, Lawrence, Mass. 01843.

**J. D. Edwards & Co.** has released **Version F of its World Distribution System** for the IBM System/38.

Version F consists of three modules. The Inventory Management System application provides for control and management of finished goods inventories. Priced at \$20,000, it can stand alone or interface with the other two modules.

The Purchasing System module reportedly offers stock and nonstock purchasing, order expediting and automatic purchase order generation and interfaces with both general ledger and accounts payable. It costs \$10,000.

The Order Processing System reportedly provides full credit controls, batch or real-time document printing, automatic pricing and inventory allocation. It costs \$20,000.

J.D. Edwards, Suite 5500, 4949 S. Syracuse St., Denver, Colo. 80237.

**Batelle Columbus Division** has introduced **Toolchest**, a computer-aided design and manufacturing (CAD/CAM) system.

Toolchest is said to provide an integrated data base for modeling and numerical-control machining of dies or parts with complex surfaces. Tool-

Continued on page 118

## Our Competition 'Mythed' The Point There Is Another Choice In 3270 Terminals

For years now, our competition has been perpetuating the myth that there are only two choices in 3270 systems. Think again. Think Harris.

### The Smarter Alternative In 3270 Terminals

We've been providing data network solutions for more than 20 years. Our long-term experience in adding value to IBM networks has culminated in our Challenger family of controllers and terminals.

Challenger is a plug-compatible, full-function 3270 system that we call the Smarter Alternative, for the value-added features it brings to the 3270 marketplace.

Our full line of controllers supports many advanced features, including DFT with up to four host sessions and windowing on your 3270 PC. Want graphics support for your IBM 3179-G displays? You've got it! If you need IBM host access from your ASCII terminals, Challenger supports ASCII/3270 protocol conversions.

Additional value-added features include 56Kbps transmission speed, NPDA and IBM RTM support, on-line configurability and unmatched upgrade flexibility, which means Challenger can easily accommodate changes in your system requirements.

Challenger's broad range of IBM-compatible displays

offers the flexibility of multiscreen formatting and color in one terminal. Now your 3180 applications can have the added productivity of color at a competitive price.

Besides offering support for the widest array of printers in the industry, including dot-matrix

and shuttle-matrix line printers, Harris is also the first supplier to offer the latest laser output technology in an 8-ppm printer, for presentation-quality business documents.

### Mutual Coexistence

Challenger supports both local and remote configurations under SNA and BSC protocols, while allowing coexistence with IBM's controllers, displays and printers. You can replace your IBM 3270 system with a Harris Challenger or simply integrate it within your existing network.

Add Harris' service and support to the value-added Challenger system and you can be confident your decision will prove to be a hit, not a myth!

Take the Harris challenge by allowing us to prove that we are the Smarter Alternative. Compare Challenger's controllers, displays and printers on your network on a trial basis. For more information on Harris Challenger, call 1-800-4-HARRIS, ext. 5000.

Harris Challenger: The Smarter Alternative

FOR YOUR INFORMATION OUR NAME IS

# HARRIS

To learn more about Harris Challenger, call 1-800-4-HARRIS, ext. 5000.

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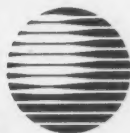
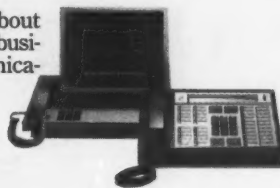
## HOW A FLEXIBLE COMMUNICATIONS SYSTEM MAKES IT EASY TO GROW AND EXPAND.

There are a lot of reasons you might be in the market for an advanced communications system. One reason is that you expect your business to grow. It only makes sense then that the system you select should be able to grow right along with it.

The AT&T System 75 is an integrated voice and data system flexible enough to do just that. Its modular architecture lets you custom-tailor a system that not only fits your needs today, but can expand as your business does. At full capacity, it can accommodate up to 800 lines. And with our unique system management function, it's easy to change and rearrange the equipment as often as you need to.

Thanks in part to AT&T's universal wiring scheme, System 75 can connect to data systems and networks easily and inexpensively. And to make your move to System 75 even smoother, AT&T Credit Corporation offers a range of purchasing and leasing options that are as flexible as the system itself.

For a free brochure about how AT&T can give your business the flexible communications system it needs, call us at 1 800 247-1212, Ext. 500.



**AT&T**

The right choice.



## NEW PRODUCTS/SOFTWARE &amp; SERVICES

Continued from page 116

chest provides drafting as well as three-dimensional design, color-shading of solid models for design verification and acceptance of CAD tapes from product designers.

Toolchest operates on Digital Equipment Corp. VAX computers and Apollo Computer, Inc. computers and ranges in price from \$16,000 to \$30,000.

Batelle Columbus Division, 505 King Ave., Columbus, Ohio 43201.

### Applications packages

Samna Corp. has released a version of Samna+ office automation software for AT&T's 3B2 computers operating under that company's Unix System V operating system.

Samna+ is a unified program said to include word processing, spread-

sheet capability and the Samna Wordbase Manager, a feature that locates a word, phrase or combinations of words throughout users' files.

The new version executes shell commands without first requiring users to close the document being created or modified.

Samna+ for the AT&T 3B2 is priced at \$2,395.

Samna, 2700 N.E. Expwy., Atlanta, Ga. 30345.

Outlook Software, Inc. has released Outlook/36 Financial Modeling System, which runs on the IBM System/36.

Outlook/36 is a full-function modeling package designed to integrate directly with the System/36's data application files. Full-screen process-

ing is provided for model building and data entry.

A model editor allows users to move, copy, insert and delete rows, columns and calculations. Users can autogenerate models, duplicate existing models or define a single model whose definition is referenced by other models. A report writer is included with Outlook/36.

The system costs \$2,495 per license.

Outlook Software, Suite 117, 1 Woodfield Lake, Schaumburg, Ill. 60195.

### Utilities

SPSS, Inc. has ported its SPSS-X and SPSS-X Tables, software tools for managing, analyzing and displaying information to Apollo Computer, Inc., Gould, Inc. and Digital Equip-

ment Corp. computers running AT&T's Unix System V operating system.

SPSS-X reportedly contains more than 50 advanced data analysis and modeling procedures. Common applications include marketing research and resource allocation modeling.

The optional SPSS-X Tables displays presentation-quality results of analyses or summarized data in various tabular forms.

First-year license fees for SPSS-X range from \$3,000 to \$10,000, depending on machine size, and from \$1,500 to \$2,000 for the SPSS-X Tables option.

SPSS, 444 N. Michigan Ave., Chicago, Ill. 60611.

Decision Technology, Inc. has released Version 7.0 of its Data Analyzer and Audit Analyzer, products used for data base retrieval, information processing and auditing.

Data Analyzer Version 7.0 is available for \$7,500. Customers on maintenance will receive the upgrade at no additional cost, the vendor said.

Audit Analyzer Version 7.0 includes an IBM CICS on-line interface and is priced at \$6,500. Current customers will receive Version 7.0 at no cost.

Both Audit Analyzer and Data Analyzer run on IBM mainframes.

Decision Technology, Princeton Corporate Center, 1020 U.S. Rt. 1, Princeton, N.J. 08540.

### Data base management systems

Microsystems Engineering Corp. has announced Mass-11 Manager, a relational data base that provides full integration with the company's Mass-11 word processing software.

Mass-11 Manager reportedly allows up to 10 data bases to be accessed simultaneously by setting up a chain of relations between the data bases' files based on key fields. It can be operated in a prompt mode, with context-sensitive on-line Help for beginners, a command file mode that allows advanced users to design custom applications with do-loops, conditionals and other programming statements or a command mode.

Mass-11 Manager runs on Digital Equipment Corp. VAX VMS systems and the IBM Personal Computer. A VAX license costs \$5,750, and a PC license costs \$495.

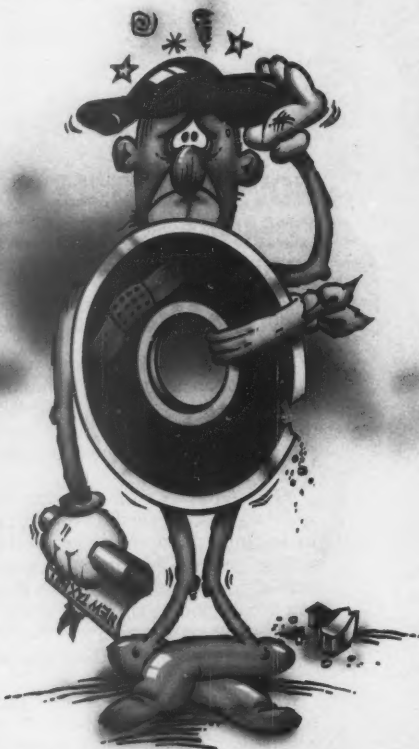
Microsystems Engineering, Suite 400, 2400 W. Hassel Road, Hoffman Estates, Ill. 60195.

Information Dimensions, Inc. has announced Release D1 of its DM relational data base management system.

Release D1 features a high-volume loader module said to allow DM users to populate DM data bases three to five times faster and to perform comprehensive validation. The network access module reportedly allows users of DM to communicate with non-local data base nodes in cluster or network environments using Digital Equipment Corp.'s Decnet.

DM runs on DEC VAXs and the Control Data Corp. Cyber series. License prices range from \$15,000 to \$43,500.

Information Dimensions, 655 Metro Place S., Dublin, Ohio 43017.



## Is Your Payroll System A Long-Term Disability?

Outdated, patched, inadequate payroll software can cause real headaches—and cost you time, money and productivity.

Now you can overcome disability with the capability of the new Pinstripe<sup>™</sup> Payroll Software System from Lawson. It's fast—processing payroll four times faster than previous editions with fewer keystrokes. It's easy—easy to implement, easy to learn, easy to use. So easy, you can have Pinstripe on-line in just two to six weeks. It's affordable—and Lawson includes source code, comprehensive training and customer support in the purchase price.

Pinstripe Payroll is packed with the features you want. Features like user-defined deductions, W-2 tape creation, 401K capability, multi-company processing and automatic direct depositing.

And you can rest easy as the new year approaches, because Pinstripe Payroll will promptly incorporate 1987 and future state and federal tax changes.

Pinstripe Payroll can stand alone as your total payroll solution. Or it can integrate with our Personnel software to form a comprehensive Human Resources Management System. Also available is a multi-level security program to keep payroll and personnel data out of unauthorized hands.

Turn disability into capability with Pinstripe Payroll from Lawson Associates, Inc. For more information, call your Lawson representative at 1-800-672-0200.

Business Software Solutions designed for IBM Mainframes, IBM System/36s, and Burroughs Mainframes; small, medium and large systems.



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AD99FC



# NonStop VLX.

Tandem technology sets the new standard  
for large applications in on-line transaction processing.

More transactions per second  
at a lower cost per transaction than any system in the world.

## THE CIRCUITRY'S FAST.

We designed the system in our own laboratory, right down to our own unique VLSI chips. The result is more circuitry in less space. With fewer components than our next largest system, the VLX delivers twice the performance and three times the reliability.



## PROCESSORS WITH LARGE APPETITES.

The VLX processors move transactions in 32-bit chunks. They reach into main memory in 64-bit chunks. Because this happens in parallel, more work gets done in less time at a lower cost per transaction.

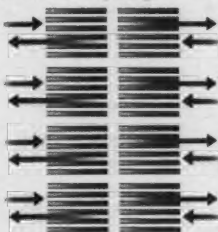
## THE SERVICE IS EASY.

All critical components are field replaceable. When service is required, it's faster. You don't even have to stop an operation to add or replace components.



## THE DATA EXPRESSWAY.

In a conventional database, I/O requests must be handled sequentially. This creates queues that slow response time. In the VLX system, there are multiple paths to multiple disks. Data enters and leaves the database simultaneously. No time is wasted, and all disk space gets used.

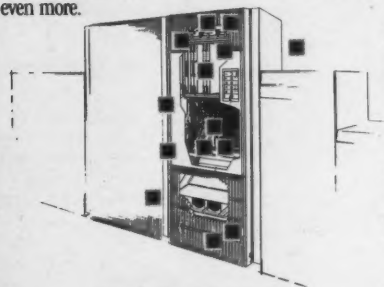


## DIAGNOSTICS FROM A DISTANCE.

An integrated microprocessor allows us to monitor the system environment from anywhere in the world. We can even run stress tests remotely. If a failure does occur, the VLX has the capability to automatically dial out to remote centers anywhere in our worldwide network.

## THE SYSTEM KNOWS THE SYMPTOMS.

Expert systems software, using fault analysis, directs the problem diagnosis systematically. It also allows us to analyze it and shorten service time even more.

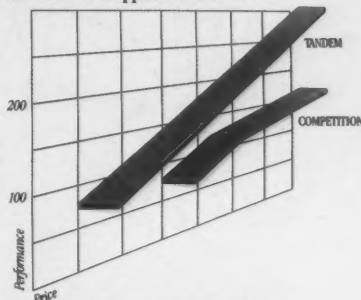


## SECRETS ARE SAFE.

We offer software that will protect the security of your data whether it's in the VLX, in another Tandem system or in transmission.

## NO GROWING PAINS.

To add power, just add processors. You can grow from a base four-processor system to 16. From there, you can expand in whatever increments you choose, all the way to 255 systems. You never buy more than you need, and you'll never have to rewrite a line of applications code.



## NO-FAULT INSURANCE.

Tandem systems achieve fault-tolerance with a unique, parallel processing architecture. There are no idle back-up components. Instead, multiple components share the workload. If one goes down, the others pick up the slack, and application processing is uninterrupted.

## HERE TODAY. HERE TOMORROW.

The VLX is compatible with any Tandem system and with all major communications standards—SNA, X.25, MAP and O.S.I. And by acting as a gateway to other vendors' systems, the VLX can link them and enhance their value as well.

## WE HAVE EXCELLENT REFERENCES.

Tandem systems are already at work for Fortune 500 companies in banking, telecommunications, manufacturing, transportation, retailing and energy, as well as several branches of the U.S. Government.

To find out what we can do for you, call 800-482-6336 or write to us. Corporate Headquarters: Tandem Computers, Incorporated, 19191 Vallico Parkway, Loc. 4-31, Cupertino, CA 95014

 **TANDEM COMPUTERS**



## NEW PRODUCTS/MICROCOMPUTERS

## MICROS

## Systems

The SST 286/C Color System, an IBM Personal Computer AT-compatible color workstation, has bowed from Microdirect, Inc.

The SST 286/C is said to incorporate full-color graphics, a Tecmar Corp. Enhanced Graphics Adapter color card and a NEC Corp. multisynchronous color monitor.

The workstation also includes a NEC letter-quality 24-pin color printer and IBM PC-DOS 3.1 operating system software, according to the vendor.

The SST 286/C is a 1M-byte system with a 1.2M-byte floppy disk drive, one parallel and two serial ports on the back panel, as well as eight expansion slots.

It is priced at \$4,786, according to the vendor.

Microdirect, 180 Bent St., Cambridge, Mass. 02141.

Compupro has announced its Compupro 286/80 multiuser system.

The system includes an 80M-byte hard disk with a dedicated 512K-byte cache buffer, a 16-slot S-100R motherboard and nine serial ports.

The system also features a built-in tape backup unit, an 800K-byte floppy disk drive, 768K bytes of main memory expandable to 1M byte and an 8-MHz no-wait-state 80286 central processor.

Compupro 286/80 is priced at \$12,500, according to the vendor.

Compupro, 3506 Breakwater Court, Hayward, Calif. 94545.

The Software Link, Inc. has unveiled Multilink Systems, its IBM PC-DOS multiuser turnkey system.

The 8-MHz system includes Software Link's Multilink Advanced multiuser

software; AT Gizmo, a Software Link memory management card for expansion; a Sperry Corp. intelligent terminal with a 40M-byte disk and one floppy drive; two Wyse Technology, Inc. 60 terminals; Software Link's serial port expansion board; and a choice of color or monochrome monitors for the intelligent terminal. A basic system costs \$8,595.

Also offered is Multilink Systems II, a multiuser accounting system. It includes the same components as Multilink Systems plus a choice of three of the company's Netprofit multiuser accounting modules and Business Basic Extended and costs \$11,595.

The Software Link, Suite 632, 8601 Dunwoody Place N.E., Atlanta, Ga. 30388.

## Software applications packages

Viewlogic Systems, Inc. has announced that its Workview software now runs on Digital Equipment Corp.'s Vaxmate personal computer.

Workview is a series of integrated desktop computer-aided engineering workstation software that features schematic entry; waveform processing; symbol libraries for standard, semicustom and analog parts; document processing to merge text and graphics; and electronic mail and file-transfer utilities. Networking capabilities are included with Workview systems.

Workview is priced from \$4,500 to \$13,000 for the IBM Personal Computer or the DEC Vaxmate.

Viewlogic Systems, 33 Boston Post Road W., Marlboro, Mass. 01752.

Healthcare Communications has announced Chiro-mac, an information management software program for Apple Computer, Inc.'s Macintosh and Macintosh Plus computers.

Chiro-mac allows chiropractors to store and retrieve patient information and produce walkout statements and insurance forms.

Billing, production, marketing and management reports can be created, according to the vendor.

The program also allows users to merge report outputs, patient information and transactions with software programs such as Microsoft Corp.'s Excel and Microsoft Word as well as Forethought, Inc.'s File-maker.

Windowing capability is also provided with the information management program.

Chiro-mac is priced at \$3,500.

Healthcare Communications, Suite 301, 245 S. 84th St., Lincoln, Neb. 68510.

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Let's face it; there are a lot of \$399 terminals being sold these days. You get a basic box, a few tacked-on bells and whistles, and not a whole lot more.

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| FEATURES                                   | TELEVIDEO 905 | WYSE WY-30 |
| Individual programmable function keys      | 16            | 4          |
| Tilt and swivel standard                   | Yes           | No         |
| High contrast super dark Matsushita screen | Yes           | No         |
| WordStar® mode                             | Yes           | No         |
| Full-size keyboard                         | Yes           | No         |

100,000,000 strokes. Even an enhanced numeric keypad.

There's also a buffered printer port. And, of course, compatibility with the TeleVideo 925 command set, the most popular and widely emulated ASCII command set in the world.

If you'd like more information just get in touch with the nearest TeleVideo regional office listed below, and we'll give you the name of your nearest distributor.

The TeleVideo 905. What a difference \$10 makes.

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will think they're sitting at an expensive workstation.

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TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94088-3568, (408) 745-7760, Regional Offices: Northwest (408) 745-7760, Southwest (714) 476-0244, South Central (214) 550-1060, Southeast (404) 447-1231, Midwest (312) 397-5400, East (516) 496-4777, Northeast (617) 890-3282. AMSTERDAM: 31.2503.35444, PARIS: 33.1.4687.34.40, LONDON: 44.9905.6464.  
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# A FEW GOOD NAMES THAT



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## NEW PRODUCTS/MICROCOMPUTERS

**Catalyst USA, Inc.** has announced **Claimtrack**, an IBM Personal Computer-compatible software product for freight claim management.

Claimtrack allows entry of claim information, prints claim documents, tracks updates, revisions and amendments and records payments, according to the vendor.

The product reportedly operates with Lotus Development Corp.'s Symphony integrated spreadsheet, allowing users to modify reports or build new ones.

Claimtrack provides various data bases, including carrier names and addresses, from which pre-entered information can be drawn as the claims are typed in.

The freight claim management software is priced at \$1,995.

Catalyst USA, 220 Oak St., Grafton, Wis. 53024.

**Chi/Cor Information Management, Inc.** has released its **Total Recovery Planning System (TRPS)** disaster recovery tool for microcomputers.

TRPS features a relational data base design to store and access all disaster recovery information, including company and personnel profiles, recovery teams and detailed recovery steps.

Other features include menu-driven operation, user-defined reporting and a methodology document that describes how to develop a disaster recovery plan using TRPS. It provides more than 40 reports.

TRPS runs on IBM Personal Computers, Personal Computer XT's, AT's or compatibles with a minimum of 384K bytes of memory.

It costs \$17,000.

Chi/Cor Information Management,

10 S. Riverside Plaza, Chicago, Ill. 60606.

**Micro Cat, Inc.** has introduced its data base application called **PCoffice Management System**.

PCoffice includes a system configuration tool that helps users determine hardware and software needs per personal computer workstation and includes configuration forms, inventory control, detailed logs on technical problems and solutions, library reference tools and a report generator. PCoffice is written in Ashton-Tate's Dbase III and is available in a compiled form for IBM Personal Computers and compatibles.

PCoffice is priced at \$395.

Micro Cat, 75-33 186th St., Flushing, N.Y. 11366.

**Chen & Associates, Inc.** has introduced **ER-Designer**, an information modeling package for IBM Personal Computers and compatibles.

ER-Designer allows a user to create entity-relationship diagrams. It uses a spreadsheet-like interface, allowing up to 5,400 entity-relationship times to be defined and manipulated, the vendor said.

ER-Designer also features an internal data dictionary that maintains relationships and attributes and performs consistency checking, the vendor said.

ER-Designer costs \$1,495.

Chen & Associates, Suite 1-E, 4884 Constitution Ave., Baton Rouge, La. 70808.

## Software utilities

**MacNeal-Schwendler Corp.** has introduced **Autofem**.

Autofem reportedly converts an Autodesk, Inc. Autocad-generated design into a finite element model that can be analyzed using the features of MacNeal-Schwendler's MSC/Pal 2 personal computer-based structural analysis software. It supports interactive color graphics and allows access to all Autocad commands, the vendor said.

MSC/Pal 2 allows designers to work with applied load conditions, including pressure, line and gravity loading. It also allows users to do model outlining for three-dimensional graphics and shrinking to verify specifications of elements.

Autofem runs on IBM Personal Computer XT's, AT's and compatibles with 512K bytes of memory. It costs \$295, and MSC/Pal 2 costs \$1,995.

MacNeal-Schwendler, 815 Colorado Blvd., Los Angeles, Calif. 90041.

## Software enhancements

**Version 4.00 of Multilink Advanced**, multiuser and multitasking software, has bowed from **The Software Link, Inc.**

Multilink Advanced is a shared-processor system that allocates random-access memory into foreground and background partitions to support multiple users at remote workstations.

Version 4.00 reportedly increases the maximum number of users or tasks supported by one IBM Personal Computer AT or compatible from nine to 17. The software also supports color and graphics on terminals and terminal emulators, which adhere to the company's color and graphics terminal protocols.

Other added features include the use of a proprietary disk caching system and the addition of a programming tool, the vendor said.

Version 4.00 is priced at \$595.

The Software Link, Suite 632, 8601 Dunwoody Place N.E., Atlanta, Ga. 30388.

**Infostructures, Inc.** has released **Version 2.0 of Popdrop**, its memory management utility program that runs on IBM Personal Computers and compatibles.

According to the vendor, users with Popdrop can load and remove memory-resident programs without having to reboot the system.

Version 2.0 has a command extension feature that allows users to remove memory-resident programs

Continued on page 126

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DataFlex is a high performance applications development database system with a rich 4th generation command language and automatic code generators. DataFlex's on-line multi-user transaction processing and powerful multi-file Query give

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## NEW PRODUCTS/MICROCOMPUTERS

Continued from page 124

with a batch file as well as from the keyboard.

Also added to Version 2.0 is a view command, which displays a diagram showing the space occupied by each layer of programs in memory.

Popdrop is priced at \$19.95, the vendor said.

Infostructures, P.O. Box 32617, Tucson, Ariz. 85751.

Borland International, Inc. has released **Turbo Tutor Version 2.0**, a guide to the Turbo Pascal language development tool for IBM Personal Computers and compatibles.

Version 2.0 consists of a 400-page tutorial guide and software on a diskette, with 10,000 lines of fully commented source code. It is an interac-

tive tutorial that allows the user to select and run an example in one window while scrolling through the example's source code in the second window.

Special sections with guidelines for programming style and use of Turbo Pascal with other Borland software are also included.

Turbo Tutor carries a price tag of \$39.95.

Borland International, 4585 Scotts Valley Drive, Scotts Valley, Calif. 95066.

### Communications

Unicom Group Ltd. has released **PC/Louis**, a micro-to-mainframe link for its query/report writer product line.

PC/Louis works in conjunction with Unicom's **LouisII** mainframe

time-sharing product and its **BetterII** counterpart for batch processing. It is said to assist the user in creating the query statements necessary to get the proper results from the mainframe.

Once this is done, PC/Louis can download the results to the personal computer in report form or data-only format.

PC/Louis is priced at \$425 per copy.

Unicom Group, Suite 206, 301 Sovereign Court, St. Louis, Mo. 63011.

**Leading Edge Hardware Products, Inc.** has added another modem to its **L series** of modems.

The 2,400 bit/sec. modem allows a personal computer user to communicate with other PC users and to ac-

cess the 2,500 on-line data bases in the country, a company spokesman said.

It reportedly operates at 300, 1,200 or 2,400 bit/sec. and plugs into the IBM Personal Computer, Personal Computer XT, AT and compatibles in full- or half-size slots.

The modem features autodialing and autoanswering and is said to be compatible with most communications software.

The modem is priced at \$289.

Leading Edge Hardware Products, 225 Turnpike St., Canton, Mass. 02021.

**Advanced Digital Information Corp.** has announced its **Model 532**, ¼-in. cartridge tape subsystem designed for local-area networks operating with Novell, Inc. **Netware** or Microsoft Corp. **DOS 3.1 MS Net** software.

The Model 532 provides a starting formatted tape capacity of 67M bytes. It acts as the host drive to which three Advanced Digital Information Model 530 tape expansion subsystems are daisy-chained in 67M-byte increments for up to 268M bytes of on-line network tape storage.

The Model 532 comes with two software packages: a DOS software driver and network archiving software.

The Model 532 is priced at \$3,490. Advanced Digital Information, P.O. Box 2996, Redmond, Wash. 98073.

### Data storage

**Micah, Inc.** has unveiled its **Micahdrive 60XT**, a 40M- to 60M-byte external hard disk drive with a tape backup unit for the Apple Computer, Inc. **Macintosh Plus**.

The Micahdrive 60XT provides a method of copying files and uses a tape medium that will store 40M to 60M bytes of information based on the length of the tape used. It attaches to the Macintosh Plus via the small computer system interface port at the back of the system.

The backup software is said to allow incremental backup as well as full backup.

The Micahdrive 60XT is priced at \$4,495.

Micah, 2330 Marinship Way, Sausalito, Calif. 94965.

**Peachtree Technology, Inc.** has announced the **S-20Plus** hard drive for the Apple Computer, Inc. **Macintosh**.

The 20M-byte drive includes 2K bytes and a dual-ported first-in, first-out data buffer for data transfer. It is also said to offer six times the speed of the Apple drive.

The drive's self-diagnostic capabilities allow it to identify and flag 28 different fault conditions in the drive, according to the vendor.

The S-20Plus is priced at \$1,395. Peachtree Technology, 3120 Crossing Park, Norcross, Ga. 30071.

### Printers/Plotters/Peripherals

**Epson America, Inc.** has unveiled the **LX-96**, an 80-col., nine-pin dot matrix printer.

The LX-96 prints 120 char./sec. in draft pica mode and 16 char./sec. in

Continued on page 128

Transfer your magnetic tape data files to any remote site in a matter of minutes.



All it takes is our STD 1600.

The STD 1600 data communication terminal provides efficient, reliable, timely data transfer to eliminate the overnight wait for delivery. It communicates with any bisynchronous terminal or computer.

The STD 1600 can communicate on-line or off-line at speeds up to 56KB to get time-sensitive data from one location to another.

The STD 1600 supports dial-up or leased lines and is easy to use. No software required, and installation can be accomplished in less than an hour.

Since 1969, Mitron's magnetic tape systems have been used in a wide variety of data communications applications. Let us explain how you can connect the STD 1600 to your system or data communication network. Can be leased or purchased.

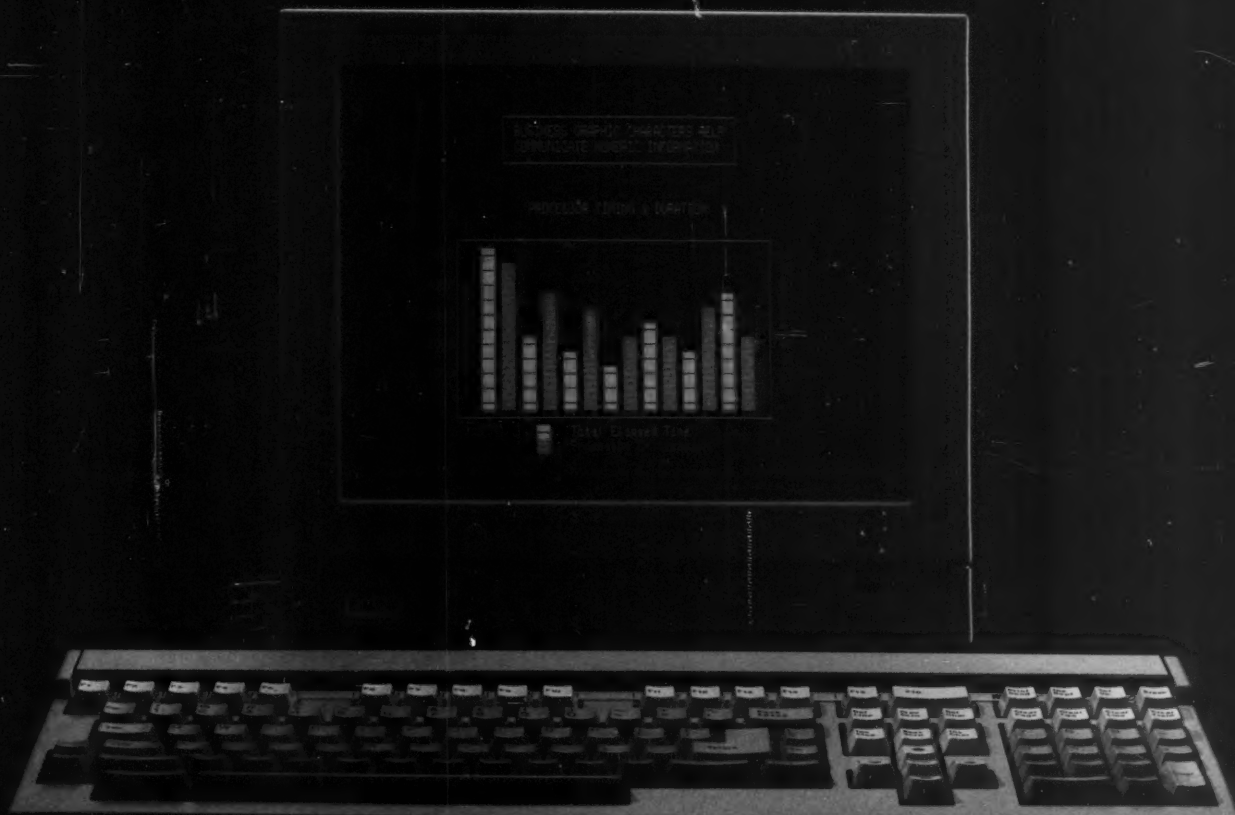
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2000 Century Plaza, Columbia, MD 21044



# OPUS2. THE FIRST OFFICE-READY TERMINAL.



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Loaded with a *host of productivity tools*, OPUS2 has a pop-up calculator, WordStar<sup>®</sup> functions in memory, and pages of help screens *ready* for your customization.

The *office automation* keyboard has a feel all its own and an ingenious Rolodex-like "flip strip" that makes function key labeling neat

and easy. Simple to learn and use, the keyboard has extra space between the keys that make all the difference to the user.

The dark background video is crisp, clean and high contrast making OPUS2's flat 14 inch screen easy on the eyes.

A 1986 Industrial Design award winner, OPUS2 comes *protocol-ready* with all the most popular emulations<sup>†</sup> built in.

With Esprit you get the *best*

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## NEW PRODUCTS/MICROCOMPUTERS

**Continued from page 126**

near-letter-quality mode. It operates both bidirectionally in text mode and unidirectionally in bit image graphics mode. It has friction feed.

The printer has a 1K-byte buffer memory, expandable up to 32K bytes with optional interface boards.

The LX-96 costs \$349.

Epson America, 2780 Lomita Blvd., Torrance, Calif. 90505.

■

**Perfect Terminal, Inc.** has unveiled its P411 terminal that emulates Data General Corp. D410 and D411 terminals.

The P411 reportedly has horizontal scrolling and windowing capabilities. The horizontal scrolling feature allows users to view 162-char. lines on the terminal's 14-in. green or amber screen, according to the vendor. The terminal has 38 programmable function keys and is ANSI X3.41 and 3.64 command-compatible.

The P411 is priced at \$795.

Perfect Terminal, 3319 Seldon Court, Fremont, Calif. 94538.

**Board-level devices**

**Omnicom Graphics Corp.** has introduced the Omni AT 1000 color graphics display board for the IBM Personal Computer AT.

The Omni AT 1000 features 1,024-pixel by 1,024-pixel resolution with eight planes and 256 colors at one time from a palette of 256,000 colors.

It also supports software packages like Autocad by Autodesk, Inc. The Omni AT 1000 was designed with 1M byte of graphics memory plus text area and high-speed graphics processors.

The Omni AT 1000 is priced at \$2,295.

Omnicom Graphics, 1734 W. Belt N., Houston, Texas 77043.

**COMMUNICATIONS****Controllers**

**Micro Technology, Inc.** has introduced its MHV11/16 quad-size communications controller.

The unit is said to support up to 16 asynchronous serial communications connections for Digital Equipment Corp. Q-bus computers. It provides RS-232C and RS-423 connections.

The 16 channels operate independently in either polled or interrupt modes, depending on user requirements. Transfer rates range from 50 to 38.5K bit/sec. per channel. All channels can run at 19.2K bit/sec.

The MHV11/16 is priced at \$1,495.

Micro Technology, 1620

Miraloma Ave., Placentia, Calif. 92670.

**Voice/data communications**

**Brooktrout Technology, Inc.** has announced the Mobilcomm 470, a voice messaging system designed for providers of mobile communications services.

The Mobilcomm 470 is said to allow voice mailboxes to be assigned to cellular telephone or beeper subscribers

on a group or individual basis. The unit is computer-based and connects directly to Direct Inward Dialing trunks and digitally records, stores and plays back voice messages.

The Mobilcomm 470 can be administered from a remote location via a modem.

The system can be configured in various ways, ranging from a unit with two incoming channels that can store two hours of messages for \$17,200 to a unit with six

incoming channels and six hours of storage time for \$23,350.

Brooktrout Technology, 173A Worcester St., Wellesley Hills, Mass. 02181.

**Protocol converters**

**Able Computer, Inc.** has announced the Able T1 Master, said to provide T1 technology to Able's Mux Master and Attach networking systems.

The T1 Master employs

statistical techniques, eliminating time-division restrictions encountered with most T1 systems. It allows the use of the High Level Data Link Control protocol. The Able T1 Master is frequency- and slot-independent and has no port limit.

The Able T1 Master is available for Mux Master and Attach networks at a cost of \$3,500.

Able Computer, 3080 Airway Ave., Costa Mesa, Calif. 92626.

# If only there were

Wouldn't it be great if you could multiply yourself? Do an honest day's work before lunch?

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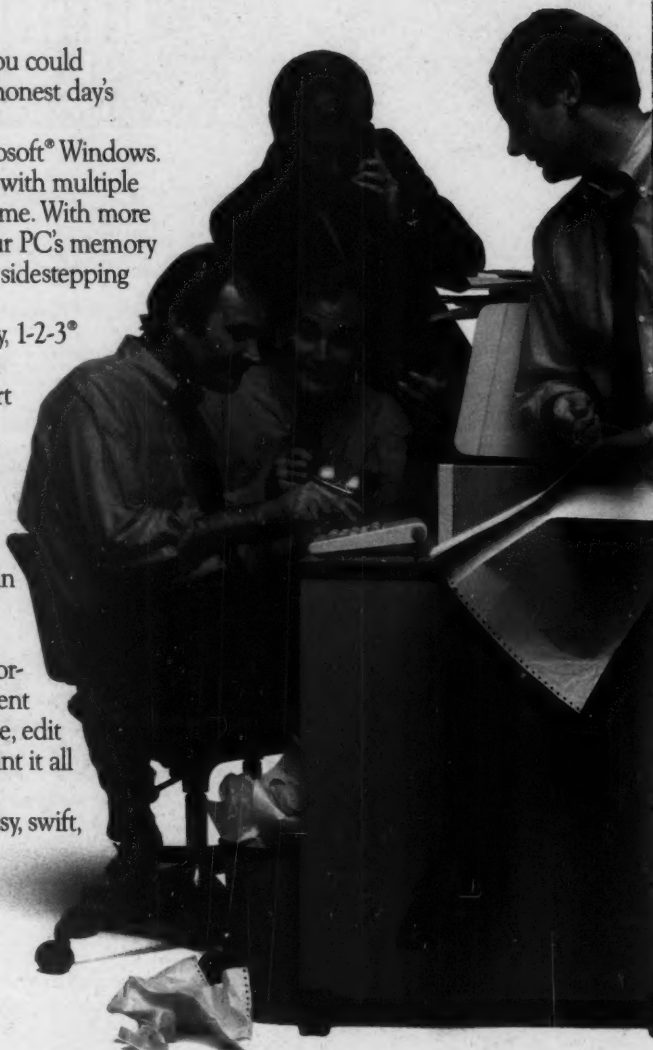
Windows lets you work with multiple applications at the same time. With more programs, in fact, than your PC's memory can normally hold. Neatly sidestepping the 640K limit.

You can switch from, say, 1-2-3® to dBase II® or to Microsoft Word or to Microsoft Chart in a couple of keystrokes.

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Then you can select information from several different programs. Collect, combine, edit it all in one place. And print it all on a single piece of paper.

The whole process is easy, swift, and natural.





## NEW PRODUCTS/COMMUNICATIONS

## Software

**Datability Software Systems, Inc.** has introduced the **RAF** remote access facility designed to allow personal computer users to communicate with remote Digital Equipment Corp. mainframes over the Ethernet communications network.

According to the vendor, **RAF** moves data over Ethernet at a rate of 100K bit/sec. **RAF** uses the Local Area Transport protocol. Users

may maintain multiple system connections while switching from one connection to another.

**RAF** microcomputer software is priced at \$395 per personal computer. **RAF** software for the VAX costs \$395 per PC connection.

**Datability Software Systems**, 322 Eight Ave., New York, N.Y. 10001.

**Western Union Corp.** has

announced **Instant Mail Manager XPC**, a communications software package said to support the X-PC error-checking protocol and Digital Equipment Corp. VT100 terminal emulation.

**Instant Mail Manager XPC** was developed for the Easylink electronic communications and information service. It allows personal computer users to emulate VT100 terminals for communication with other computers.

**Instant Mail Manager** is priced at \$185. It can be used with an IBM Personal Computer, Personal Computer XT, AT or compatible with Microsoft Corp. MS-DOS or IBM PC-DOS Versions 2.0 or higher.

**Western Union**, One Lake St., Upper Saddle River, N.J. 07458.

## Multiplexers/Modems

**Ark Electronic Products, Inc.** has introduced the **208**

## A/B modem.

The **modem** is a full- and half-duplex modem that operates synchronously at 4.8K bit/sec. over both public switched telephone networks and leased-line circuits. It features a built-in eye pattern generator for monitoring the quality of the transmission line without interrupting or degrading system performance. It may be used as a replacement for AT&T 208A- and 208B-type modems and is said to be on-line-compatible with the Ark 9.6/208 B Dial Modem at 4.8K bit/sec. The 208 A/B modem's high-density card nest supports eight modems.

The Ark 208 A/B unit is priced at \$1,495.

**Ark Electronic Products**, 1500 W. Nasa Blvd., Melbourne, Fla. 32901.

**Burr-Brown Corp.** has announced the **LDM85** limited-distance modem, said to offer a multidrop capability that allows local-area networks to be formed with the isolation and data security of a fiber-optic data highway.

The **LDM85** operates at data rates from DC to 5M bit/sec. at distances up to two kilometers. It features an RS-232 port.

Pairs of the units may be used as repeaters, extending data transmission distances.

The **LDM85** is priced from \$169 to \$179.

**Burr-Brown**, P.O. Box 11400, Tucson, Ariz. 85734.

**Practical Peripherals** has introduced the **Practical Modem 1200 SA**, a stand-alone 1,200 bit/sec. modem.

The modem is said to be fully Hayes Microcomputer Products, Inc.-compatible. It includes autodial and autoanswer capabilities, supports communications software and includes an upgrade path for a programmable enhancement card. The modem complies with AT&T 212A and 103 standards and includes two-wire, full-duplex direct-connect interface. The data interface is standard RS-232C.

The **Practical Modem 1200 SA** is priced at \$239.

**Practical Peripherals**, 31245 La Baya Drive, Westlake Village, Calif. 91362.

**Digi-Voice Corp.** has announced the **Accu-Mux-56**, an interleaved, time-division multiplexer.

The **Accu-Mux-56** was designed to provide a method of substrate multiplexing of 56K bit/sec. dataphone digital service, group-band or satellite data circuits. It has six channel ports capable of operating at 19.2K, 9.6K and 4.8K bit/sec. End-to-end syn-

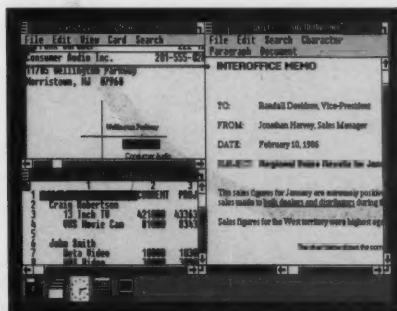
Continued on page 130

# more of you.

We've only just begun. Windows is a graphic extension of MS-DCS® which adds a powerful new dimension to the system. A more inviting interface of pull down menus, dialog boxes, scroll bars, and icons. Which give you a more intuitive way to work.

All these elements are your bridge to the next generation of applications. Programs which can be easily integrated and which take advantage of Windows' common interface for commands, options, and data exchange. Learn one Windows program, you've virtually learned them all.

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Buy Windows now and you get a whole desktop full of applications, including: A calendar, clock, cardfile, notepad, and calculator, as well as telecommunications and DOS file management programs. All to help you manage your day to day business.

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## NEW PRODUCTS/COMMUNICATIONS

Continued from page 129

chronization is continually monitored through the use of overhead bits in the aggregate data stream.

The Accu-Mux-56 is priced at \$1,350.

Digi-Voice, 400 Plaza Drive, Secaucus, N.J. 07094.

### Local-area networks

Western Digital Corp. has announced the WD8000S station board, the WD8000SH station board with an integral mini-hub and the WD8010 stand-alone, 10-port hub for use with Novell, Inc. and IBM Personal Computer local-area network-compatible software.

Both station boards plug into the IBM PC, PC XT, PC XT Model 286 and the PC AT or compatibles. The WD8000SH is said to allow up to 10

stations to be attached in daisy-chain fashion.

According to the vendor, any two hubs can be up to 800 ft apart. An entire network can communicate over 10 levels of hubs and span a total of up to 16,000 ft.

The WD8010 10-port hub is priced at \$495. The station boards are priced at \$275 with an integrated mini-hub and \$199 without.

Western Digital, 2445 McCabe Way, Irvine, Calif. 92714.

Optelecom has announced the Model 4250 Omnet extender module designed to extend Corvus Systems, Inc. Omnet local-area networks over dual-fiber cable.

The extender module is said to provide transparent interconnection

with the Omnet network system. It operates at data rates ranging from 500K bit/sec. to 4M bit/sec. and offers a typical extension range of more than 4,000 ft.

Each Model 4250 extender module is priced at \$500.

Optelecom, 15930 Luanne Drive, Gaithersburg, Md. 20877.

### Network services

E. F. Hutton & Co. has enhanced its Huttonline electronic information service to include real-time future quotes.

Huttonline users are able to call up quotes from any of eight North American commodities and futures exchanges, the vendor claimed. Huttonline is an on-line service said to allow users to access information on their own brokerage account at E. F.

Hutton as well as current market information.

Exchange fees for real-time quotes range from \$5 per month to \$50 per month. The basic Huttonline is 25 cents a minute from 8 a.m. to 6 p.m. weekdays and 10 cents per minute on nights and weekends.

E. F. Hutton, One Battery Park Plaza, New York, N.Y. 10004.

General Electric Information Services Co. has announced that users of its teleprocessing network are able to use Dow Jones & Co.'s Dow Jones News/Retrieval service.

The Dow Jones News/Retrieval is a source of business and financial news and information featuring more than 40 data bases of information including *The Wall Street Journal*, current stock quotes and Securities and Exchange Commission data on publicly held companies.

Cost for Dow Jones News/Retrieval via GE Information Services' teleprocessing network is \$1.97 per minute for prime-time access and 44 cents per minute for nonprime-time access.

GE Information Services, 401 N. Washington St., Rockville, Md. 20850.

General Electric Information Services Co. has announced that Easysabre, the American Airlines personal reservation system is now available on Genie, the General Electric Network for Information Exchange.

Features available to users of Easysabre through a personal computer or ASCII communicating terminal include access to detailed airline flights and schedules, the ability to make car and hotel reservations worldwide and arrange for ticket pick up, according to GE Information Services.

Genie is available for \$5 per hour nonprime time at 300 bit/sec. or 1,200 bit/sec, according to the vendor.

GE Information Services, 401 N. Washington St., Rockville, Md. 20850.

### Test equipment

Atlantic Research Corp. has introduced the ETM-4-1 mini breakout box for monitoring and accessing the RS-232 terminal/modem interface.

The ETM-4-1 is said to verify RS-232 data and control signals. It provides DVOM or scope access to data and control leads.

Patch access to the interface leads allows tests such as modem or terminal loopback to be performed.

The ETM-4-1 breakout box can be utilized for temporary cabling for nonstandard interfaces, according to the vendor.

The ETM-4-1 Breakout Box is priced at \$130.

Atlantic Research, 5390 Cherokee Ave., Alexandria, Va. 22312.

Phoenix Microsystems, Inc. has introduced the 5575 Micro Bert test and measurement device for T1 circuits.

The 5575 is a hand-held tester powered by a battery or a 110-v.

Continued on page 132

## Our Data Entry Systems Are Always Graded On A Curve.

Keeping data entry professionals happy is the toughest test of all. A test that finds Pertec at the top of the class.

Ask anyone with several years in data entry about the best systems they've used. They'll mention XL, CADE, CMC and Sperry—all systems built by Pertec.

Pertec is the name behind a majority of the world's installed data entry systems. And now you'll find our name on the System 3200—a family of MC68000-Series computers that perceptively combine data entry with other business functions.

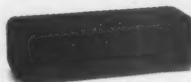
No longer is your data entry machine simply a front end to a mainframe or mini-computer. System 3200 gives you popular languages like RM/COBOL and SBASIC, networking, PC compatibility, centralized file sharing/serving, word processing and data

communications. If it's a business need, it's a System 3200 feature.

Data entry, batch processing and applications are all handled on a single, reliable machine that supports up to 64 standard and intelligent workstations. Workstations designed to satisfy the fastest, most demanding operators.

Intelligent workstations are microprocessor-based, high-speed, coax-connected machines that run REMEDY, Pertec's multi-featured, industry standard DE software.

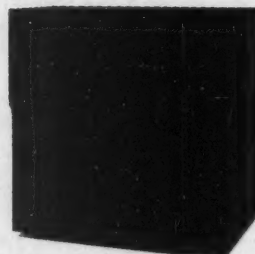
REMEDY incorporates 15 years of DE experience, and when coupled with the System 3200, offers



Pertec's Desktop Computers support up to 16 workstations.



The 3235 Floor Cabinet Computer provides sophisticated DE for 32 users.



Support up to 64 workstations with Pertec's 3235 or 3280 Floor Cabinets with the convenience of built-in 1/2" tape.

you impressive increases in productivity and reductions in costs.

Pertec studied your needs and came up with all the right answers—REMEDY and the System 3200. To learn more, call 1-800-854-8412 (TWX 910/595-1912) and discover the data entry system that more than makes the grade.



Pertec Computer Company  
17052 Armstrong Ave.  
Irvine, CA 92714  
(714) 865-7580



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Register now to guarantee enrollment. Don't wait until it's too late!

## Introductory and Advanced "In-Depth" Tutorials on Key Data/Voice Telecom Topics

Date: **Monday, February 9, 1987**  
Time: **9:30 am–5:30 pm**

Place: **Communication Networks '87**  
**Washington Convention Center, Washington, D.C.**

**Choose the tutorial that will profit you the most:**

### T-1 Open Systems Integration (OSI)—A Technical and Strategic Review

Leader: Harold C. Folts, Executive Director, OMNICON, Inc.  
Enroll in this intensive one-day tutorial for a thorough understanding of the concepts and terminology of OSI, a working knowledge of the OSI architecture, an introduction to the seven layers of OSI protocols, and expert guidance in applying OSI to the evolution of distributed information systems. *Level: Intermediate.*

### T-2 ISDN—Status and Developments

Leaders: James G. Herman, Director, and Mary A. Johnston, Senior Consultant, Telecommunications Consulting Group, BBN Communications  
In this tutorial you'll learn what ISDN will and won't deliver in the late 1980s, what the emerging ISDN standards will mean for new services and improved network performance, what holes still exist in the standards and trials, how to make smart buying decisions while keeping open your options for ISDN compatibility, and more. *Level: Intermediate.*

### T-3 Strategic Planning for Corporate Information Networks

Leader: Dr. Howard Frank, Howard Frank Associates  
Attend this tutorial to learn how to relate vendor offerings and technological trends to your organization's needs and requirements, and to develop a framework to plan future services and systems. You'll examine current issues in network integration, why communication departments must function as "mini telcos," and the pros and cons of software defined networks and private dedicated networks. *Level: Introductory–Intermediate.*

### T-4 Planning and Designing Networks with the New Technology

Leader: Dr. John M. McQuillan, President, McQuillan Consulting  
In this intensive seminar, you'll get acquainted with the key architectural principles used by today's leading network planners. You'll review emerging technologies such as T-1 networks, hybrids, VSATs, gateways between SNA, LANs and X.25, micro-mainframe links, intercompany networks, and more. *Level: Advanced.*

### T-5 Building the Network Management and Technical Control Facility

Leader: Gabriel Kasperek, President, Kazcom, Inc.  
This one-day course will help you understand the strategic value of network control, explore alternative technologies for managing your network, and discover how to evaluate current technologies for use in your own organization. You'll become familiar with the test equipment you need for successful network control and understand industry trends and future directions. *Level: Introductory–Intermediate.*

### T-6 Designing Voice and Data Networks under the New Tariffs

Leader: Robert L. Ellis, President, The ARIES Group Inc.  
Take this tutorial to learn the structure of the post-divestiture tariffs, the latest January 1987 changes to these tariffs, how to price interstate private lines, how to configure and price interstate FX services, the new economics involved in configuring data networks, the LATAs—pure strategy, and more. *Level: Intermediate.*

### T-7 Managing the Telecommunications Resource

Leader: Gerald P. Ryan, President and Founder, Connections Telecommunications Inc.  
This one-day course briefs you on how to develop a successful management environment. You'll learn what tools are available to do your job more professionally, how to plan a network management center, how to staff and train the department, and how to prepare and substantiate departmental budgets. *Level: Intermediate.*

### T-8 IBM Token-Ring Versus Other LAN Choices

Leader: Dr. Kenneth J. Thurber, President, Architecture Technology Corp.  
This tutorial gives you an across-the-board overview of announced products, future plans, compatible products, and IBM's overall strategy with respect to Token-Ring technology. You'll discuss the Token-Ring's relationship to IEEE 802.5 and get an in-depth look at NETBIOS and APPC/LU 6.2 interfaces, and more. *Level: Intermediate.*

### T-9 VSAT Technology and Implementation

Leader: Dr. Jerome G. Lucas, President, TeleStrategies Inc.  
Learn the basics of applying very small aperture terminal (VSAT) satellite communications to your networking needs. You'll get acquainted with basic application requirements in SNA networking, data broadcasting, PC networking, video broadcasting, and teleconferencing. *Level: Intermediate.*

### T-10 IBM's Systems Network Architecture (SNA): A Detailed Road Map

Leader: Daniel Zatyko, President, Zatyko Associates  
Enroll in this intensive one-day tutorial to understand the evolution of SNA, and learn fundamental SNA concepts, the seven SNA architectural layers, SNA's physical and logical addressing, strategic SNA products, components of NetView, Token-Ring networks, functionality and capabilities of the LU 6.2/APPC and NETBIOS interfaces, and more. *Level: Intermediate.*

### T-11 An Introduction to Data Communications Today

Leader: Gary Audin, President, Delphi Inc.  
This course introduces you to the basic concepts, terminology and technology of data communications. You'll learn how various networks operate and how to select them; how best to interconnect computers, terminals, and PCs using different protocols; and what software is necessary to support protocols and network management. *Level: Introductory.*

### T-12 Understanding the Communications Regulatory Environment

Leader: Richard E. Wiley, Senior Partner, Wiley, Rein & Fielding  
Enroll in this tutorial to learn how telecommunications policy is made and changed, what agencies are active in policy making, how industry segments are affected by current policies, what key issues are now under consideration, and how you can influence future decisions. *Level: Introductory.*

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Registrations cancelled later than January 30 are subject to a \$50.00 service charge.  
Registrations may be transferred at no charge.

Note: all prices include lunch, coffee breaks and tutorial materials.

Return registration form to: **CN '87, PO Box 9171, Framingham, MA 01701-9171 Or call TOLL FREE 1-800-225-4698**

CW2



## NEW PRODUCTS/COMMUNICATIONS

Continued from page 130

220-volt AC power supply. It features a 2-line by 40-char. LCD display, 10 LEDs and a 26-key keyboard. It generates and receives test patterns.

The 5575 Micro Bert is priced at \$2,495.

Phoenix Microsystems, P.O. Box 4206, Huntsville, Ala. 35802.

### Auxiliary equipment

T-Bar, Inc. has announced two V.35 port cards for its DSM Galaxy Distributed Matrix Switch.

For direct-dial service for tariffed carrier services, the V.35 direct-service unit port cards increase port availability by 300%, according to the vendor.

The cards reportedly permit retaining full nonblocked capacity, allowing 2,048-port switching at 56K to 64K bit/sec.

The port card for DTE/DTE Cross Domain applications is said to directly interconnect IBM 3725 Front End Processors at 256K bit/sec. at the fully nonblocked matrix switch capacity.

Each four-port card is priced at \$1,525.

T-Bar, P.O. Box T, 141 Danbury Road, Wilton, Conn. 06897.

Networkx has introduced the A-B Switchbox, a connection device said to provide maximum system integration.

A parallel port unit with 36 lines switched, the A-B Switchbox allows users to add peripherals. It functions as a compatible parallel interface for printers.

The A-B Switchbox is priced at \$119.95.

Networkx, 203 Harrison Place, Brooklyn, N.Y. 11237.

Gold Key Electronics, Inc. has announced the Gold Key Converter, a parallel-to-serial port converter for IBM Personal Computers or compatibles.

The Converter is said to convert the parallel port to a serial port, allowing users to drive a serial printer. It features an internal data buffer for storing the computer's output and connects directly to a parallel printer cable.

According to the vendor, the Converter is transparent to the computer and the printer. It supports X-On/X-Off and data terminal-ready protocols.

The Model PS-16 with 16K bytes of buffer memory costs \$149, and the Model PS-64 with 64K bytes of buffer memory costs \$229.

Gold Key Electronics, P.O. Box 186, 11 Cote Ave., Goffstown, N.H. 03045.

Bytex Corp. has introduced the Autoswitch 4000, said to be the highest capacity nonblocked matrix switch available.

The Autoswitch 4000 is a 4096-port, fault-tolerant system that can be configured in a distributed manner. Other Bytex systems, the Autoswitch 240 and Autoswitch 480, handle 240 and 480 ports, respectively.

Available in 90 days, prices start at \$75,000, with a typical system

selling for \$200,000.

Bytex, Turnpike Road, Southboro, Mass. 01772.

## SYSTEMS & PERIPHERALS

### Processors

SBE, Inc. has announced its SBE/MPU-20 Multibus board.

The SBE/MPU-20 is a single-board 6820 solution said to run at either 12.5 MHz or 16.7 MHz. One megabyte of parity-protected random-access memory (RAM) is available on the board with 256K bytes of RAM chips. The board's maximum capacity can be doubled with use of a memory expansion module.

Serial and parallel I/O are provided by two multiprotocol, full-duplex

serial ports and a 68230 24-bit bidirectional parallel port and timer. The MPU-20 also has four 28-pin erasable programmable read-only memory sockets.

The SBE/MPU-20 costs \$1,995.

SBE, 2400 Bisso Lane, Concord, Calif. 94520.

Symbolics, Inc. has unveiled its 3645T Tempest computer system.

The 3645T is designed to eliminate electromagnetic interference emissions that can cause damage to data, the vendor said.

It includes 8M to 24M bytes of memory, two 190M-byte removable disk drives, three RS-232 ports, an Ethernet port, a console with keyboard and mouse and Symbolics' Genera software environment.

An optional floating-point accelerator and ¼-in. tape drive are also available.

Available late this year, the 3645T is priced at \$104,900.

Symbolics, 4 New England Tech Center, Concord, Mass. 01742.

DY-4 Systems, Inc. has introduced the DVME-104, a single-board computer.

DVME-104 reportedly has a 10- or 12.5-MHz 68010 CPU and 1M byte of dynamic random-access memory.

It supports dual-ported memory, separate local and global VMEbus addresses and local global memory access and write protection.

The product contains two serial asynchronous or synchronous full-duplex channels, available via the P2

# Which way we learn about text ma

## On your own?

For years text management has hovered on the outer fringes of MIS consciousness.

Which is strange, considering how important it is to some of the key people MIS has to serve.

Like company attorneys faced with an unexpected lawsuit.

It's at times like these that text management software has proven its value in organizations all over the world—delivering benefits people didn't even know existed a short while ago, and creating a crescendo of demand at the very highest organizational levels.

What does this mean to you? Several things:

First, it means you'd better understand what text management is all about—before your users do. (Hint: if you're thinking "word processing," read on.)

Second, it means you'd better select a text management system with the features *users* need to obtain information—plus the features *you'll* need to maintain system integrity. Users need specialized text search and index facilities conventional DBMS's don't offer; you need database and system control facilities dedicated retrieval systems don't offer.

And third, it means you'd better start evaluating text management systems and vendors without delay. And there's no better way to begin that evaluation than by taking a close look at INQUIRE/Text—the most comprehensive, proven text management software system on the market.

### Text management; It's not word processing. And it's not data management.

Traditional corporate information systems do a great job managing structured data. Unfortunately, the information most needed by decision-makers is often unstructured—embedded in the text of documents such as letters, memos, reports, contracts, and transcripts. Because this material has traditionally been beyond the reach of online systems, access to it has been slow, tedious, and error-prone. Word processors and other office automation systems have greatly accelerated document creation and distribution, but they are all but useless in making the actual information content of documents available as an online resource.

A text management system fills this need by providing highly sophisticated facilities for online index, search, and retrieval of information in stored documents. With a text management system, users at all organizational levels can pinpoint specific pieces of information within vast volumes of text—instantly. And once they've found the information, they can edit it, combine it, and report it out with complete flexibility.

Not surprisingly, the biggest text management system users have tended to be companies engaged in complex litigation or regulatory proceedings. But as text databases have proved their value in these initial applications, they have increasingly been used in others as well—from competitive intelligence gathering to online maintenance of technical documentation to a full array of corporate records management tasks. And as senior ex-

ecutives have become comfortable with text management facilities, they have increasingly mandated their use throughout the organizations that report to them.

The results: a dramatic improvement in the overall quality of information available to decision-makers. And a dramatic increase in pressure on MIS to deliver top-flight text management capability.

### INQUIRE/Text: The features users need. The control you need.

As the demand for text management capability has grown, so has the number of vendors claiming to provide it. But few of these vendors offer the features, the flexibility, and the track record of Infodata's INQUIRE/Text.

INQUIRE/Text's automatic indexing and powerful keyword search and retrieval facilities have set industry standards in text management for years. INQUIRE/Text's easy-to-use menu screens, ability to handle both structured and unstructured fields, and flexible interfacing options have made it a hit with users in all departments, while also easing the tasks of the MIS personnel charged with implementing it. And INQUIRE/Text's track record in over \$50 billion worth of litigation support applications—to say nothing of the rest—makes it easy to justify to top management.

INQUIRE/Text: It's the first thing you need to know about text management. ♦



## NEW PRODUCTS/SYSTEMS &amp; PERIPHERALS

connector, four front-panel status LEDs, two software-readable sense switches, system controller functions, built-in test equipment and board isolation mode.

The DVME-104 computer is priced at \$2,939.

DY-4 Systems, Suite 202, 1475 S. Bascom Ave., Campbell, Calif. 95008.

DY-4 Systems, Inc. has unveiled its DVME-134 single-board computer.

The DVME-134 offers 1M byte of dual-ported dynamic random-access memory with zero wait states and up to 128K bytes of programmable read-only memory, according to the vendor.

Pull 32-bit VMEbus address and data transfers are also supported.

It reportedly contains one asyn-

chronous, serial full-duplex channel, available via the P2 connector and the front panel for use as a maintenance monitor.

Some features of the DVME-134 include I/O via the P2 connector, four front-panel status LEDs, two software-readable sense switches, system controller functions, built-in test equipment and board isolation mode.

The DVME-134 is priced at \$2,872.

DY-4 Systems, Suite 202, 1475 S. Bascom Ave., Campbell, Calif. 95008.

## CAD/CAM/CAE

Calma Co., a subsidiary of General Electric Co., has enhanced its GDSII integrated circuit design system.

The system now features windowing capabilities that enable users to view portions of the physical design

concurrently with the entire design system.

It also has the ability to drive the optional Fast Mask Engine, used for fast background processing and electrical and design rule checking, directly from GDSII/32 hardware.

The system's applications packages, Customplus and Techplus, have also been enhanced, according to the vendor.

A Data General Corp. DS4200-based GDSII/32 system with Customplus costs \$100,000. The Fast Mask Engine costs \$60,000.

Calma, 501 Sycamore Drive, Milpitas, Calif. 95035.

Calma Co. has announced its Board Series of printed circuit board engineering and design products.

Board Designer provides full functionality required for printed circuit board design, including schematic capture, board geometry, packaging and pin assignment, interactive editing and autoplacement.

Board Editor Plus has the same design and layout capabilities as the Board Designer, except for routing and computer-aided manufacturing (CAM) capabilities.

The Board Expeditor is a routing node that provides background functions and CAM support.

The Board Series is available for Apollo Computer, Inc.'s DN660 and DN3000C.

Board Designer prices start at \$50,000, Board Editor Plus starts at \$40,000 and Board Expeditor starts at \$75,000.

Calma, 501 Sycamore Drive, Milpitas, Calif. 95035.

## Graphics systems

Mitsubishi Electronics America, Inc. has announced its G500 color printer/plotter system, an enhancement of its G500 color graphics line printer.

The printer/plotter consists of the printer and a controller card for any IBM Personal Computer, Personal Computer XT, PC AT or compatible. The card reportedly allows the user to run Autocad, Inc.'s Autocad and other graphics design packages and to emulate Hewlett-Packard Co. and Houston Instrument Co. plotters.

The G500 prints 1 page/min. with a resolution of 240 by 240 dot/in. in up to seven colors and prints on fan-fold paper or on transparencies, the vendor said.

The G500 costs \$5,500.

Mitsubishi Electronics America, 991 Knox St., Torrance, Calif. 90502.

## Data storage

Telebyte Technology, Inc. has unveiled its Packetape, RS-232-based ¼-in. cartridge tape drive system.

Packetape reportedly provides storage of up to 67M bytes of formatted data.

It allows data capture for logging, archival storage or other applications from virtually any RS-232 asynchronous data source without software protocol, the vendor said.

It is also reported to accept data at transfer rates up to 57.6K bit/sec., including all standard bit/sec. rates.

Packetape costs \$2,990 in desktop enclosure.

Telebyte Technology, 270 E. Pualaski Road, Greenlawn, N.Y. 11740.

Dual Systems Corp. has enhanced its VSMD-32 storage module device and VESDI-32 enhanced small device interface disk controllers.

The enhanced disk controllers are able to mix any common logic system page size with any smaller physical disk block size, according to the vendor.

The upgrades also feature 48-bit error correction codes, 2.4M byte/sec. drive transfer rates, zero-latency full-track reads and writes, 32-bit direct memory access, 32-bit addressing, automatic defect skipping and high-speed multiblock reads and writes.

The VSMD-32 and the VESDI-32 each cost \$1,990.

Dual Systems, 2530 San Pablo Ave., Berkeley, Calif. 94702.

# Would you rather management software?

## Or from your legal department?

Today's rising tide of litigation is placing extraordinary demands on corporate legal departments—forcing attorneys to prepare and manage cases of unprecedented volume, complexity, and public visibility.

In this environment, it's no wonder that so many legal departments are turning to computerized systems to manage critical aspects of their work. And one of the key functions they're looking for is the ability to perform fast, accurate online text searches—a function no system performs better than INQUIRE/Text.

### INQUIRE/Text: Proven in companies—and in court.

INQUIRE/Text is a proven, cost-effective system that facilitates the full range of legal department activity—not to mention broader corporate information management strategies.

With INQUIRE/Text, the time and cost of document searches can be sharply reduced. Even more important, INQUIRE/Text can actually enhance professional performance—especially under severe case loads.

By enabling people to share updated information instantaneously, INQUIRE/Text facilitates the preparation of complex cases while minimizing the error potential associated with large volumes of paper documentation. And by tracking key events and costs, INQUIRE/Text contributes to improved efficiency without compromising the quality of service provided.

Equally important, INQUIRE/Text is a system proven in some of the most pressing litigation in American history. It's being used right now in

the massive asbestos liability case. And it's been relied on for years in other cases ranging from antitrust to negligence—to administrative hearings before government regulatory bodies.

INQUIRE/Text: It's the system legal departments need. It's the system you need to know.

### What works for attorneys can also work for MIS—and others.

You might expect a system as sophisticated as INQUIRE/Text to be difficult for non-DP-oriented users to master. But it's not. Even attorneys who are new to computers find INQUIRE/Text easy to learn and quickly habit-forming. As they become more experienced, they soon discover additional capabilities that can materially enhance their ability to make and present decisions and opinions.

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## NEW PRODUCTS/SYSTEMS &amp; PERIPHERALS

## Terminals

**Carroll Touch Corp.** has introduced **touch input systems** for Tektronix, Inc. 4105 and 4107A terminals.

When the screen is touched, a computer determines the position of each touch, which the application program then relates to the command or function that was selected and performs the designated action.

The touch system includes the company's 13-in. Smart-Frame and custom insert that fits inside the existing bezel.

It also includes the Carroll Touch Smart-Y serial splice controller that reformats 7-bit ASCII-compatible protocol into 8-bit bytes for communication with Smart-Frame.

The touch system is priced at \$1,000.

Carroll Touch, P.O. Box 1309, Round Rock, Texas 78680.

**Falco Data Products, Inc.** has announced the **Falco 5500**, an ASCII terminal featuring multihost windowing capabilities.

According to the vendor, the Falco 5500 features concurrent processing and virtual terminal operating mode capabilities. Other features include two bidirectional RS-232-C and RS-422 serial ports and a formatted screen display of up to 40 lines by 132 columns.

The terminal is compatible with Wyse Technology Corp.'s WY-50, Televideo Systems, Inc.'s 955/950/925/920/910, Hazeltine's 1500, Applied Digital Data Systems, Inc.'s Viewpoint and IBM's 3101 operating

modes.

The Falco 5500 costs \$495.

Falco Data Products, 1294 Hamerwood Ave., Sunnyvale, Calif. 94089.

## Printers/Plotters

**Integrated Marketing Corp.** has announced **Data Manager Plus**.

Data Manager Plus is an RS-232 switch and print spooler that reportedly allows up to five computer users to share one printer. The spooler buffer is 250K bytes, expandable to 1M byte.

Data is transmitted from the computer's serial port to the Data Manager Plus at speeds from 300 to 38K bit/sec., the vendor said. It interfaces with local-area networks or other Data Manager Plus devices that connect all computers that require shar-

ing of printers.

The Data Manager Plus is priced at \$595.

Integrated Marketing, Suite H, 1031 East Duane Ave., Sunnyvale, Calif. 94086.

**C. Itoh Electronics, Inc.** has introduced the **CIE 3000 S** ion deposition printer.

The CIE 3000 S reportedly provides line printer emulation and has a print speed of 30 page/min with 300 by 300 dot/in. resolution.

The printer comes with four fonts and graphics capabilities and is said to employ up to 4.5M bytes of page buffer.

It allows storage of up to six forms in random-access memory for recall by the host computer.

The CIE 3000 S is priced from \$17,000 to \$20,000, depending upon configuration.

C. Itoh Electronics, Image Group, 2515 McCabe Way, Irvine, Calif. 92714.

**Xerox Corp.** has introduced the **Xerox Telecopier 7020**, a Group 3 facsimile machine said to print on plain, untreated paper.

Designed for use by small to medium-size companies and departments, the Xerox Telecopier 7020 offers automatic speed dialing and can perform as an office copier, the vendor stated.

Priced at \$4195, it will be available in January 1987.

An RS-232 connection is expected in mid-1987.

Xerox, 100 Clinton Ave. S. Rochester, N.Y. 14644.

## Power supplies

**R. H. Research, Inc.** has introduced its uninterruptible power supply, named **Datasaver**, for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

Datasaver automatically transfers all data in memory to disk and turns off the computer within one minute of a power failure, according to the vendor.

An interrupt signal is initiated at the moment of disruption, and the PC issues an I/O shutdown command.

It includes an autosave and autorestore feature that allows the PC to perform applications tasks unattended.

Datasaver costs \$463 for the 300 VA package and costs \$533 for the 400 VA version.

R. H. Research, Suite 0, 4432 Enterprise St., Fremont, Calif. 94538.

## Components

**SBE, Inc.** has announced the **SBE VCOM-8** and the **VMEM-4** products for the Motorola, Inc. VMEbus.

The SBE VCOM-8 is a full-function communications board designed to work as either a terminal cluster controller or as a data concentrator. It handles data transfer rates up to 38.4K bit/sec. for each of its eight RS-232-C channels.

The VMEM-4 is a 4M-byte, dynamic random-access memory board. It supports 8-, 16- and 32-bit aligned transfers as well as 32-bit unaligned transfers. It accommodates both 16- and 32-bit processors.

Continued on page 139

## "One phone call...and I can place my clients' advertising in virtually any computer market in the world."

Ellen Freeman is president of Freeman Associates, a media planning and buying service for high-tech advertisers. With 11 years of agency experience, Ellen is one of a handful of people who understands how to plan media for high-tech companies. She has been involved with international as well as domestic programs, and she has definite opinions about the services of CW Communications.

Ellen explains, "High-tech companies generally don't have the information they need to evaluate international markets. But CW International Marketing Services makes it easy to explore foreign markets by offering in-depth marketing knowledge and expertise."

Ellen recognizes the frustration of media buyers when considering foreign media. She says, "There are so many factors involved — time and language differences, commission structures, exchange rates, taxes, translation, mechanical specs. Billing alone is a nightmare." She adds, "But CW offers the single-vendor solution. One phone call to a local rep, and I can place my clients' advertising in virtually any computer market in the world."

She continues, "There is a definite lack of research available on foreign publications in comparison to the volume of circulation and readership information provided by U.S. publications." However, Ellen trusts CW International Marketing Services to help her make media choices. She explains, "CW brings more information to the table than any company I've dealt with. No one else makes international buying as easy."

Ellen sums it up, "There are too many things U.S. media buyers take for granted. Buyers generally don't even know the right questions to ask when dealing abroad. CW helps us plan and buy media in multiple countries — all in one 'American' package, eliminating costly errors."

To find out how CW International Marketing Services can help you, call Frank Cutitta, Managing Director, toll-free at 800-343-6474 (in MA, 617-879-0700).



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Ellen Freeman  
President  
Freeman Associates  
Wellesley, MA



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INS planned on PCs becoming a major component in the development of information



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# Coax Connection

systems. We designed our Gateways to be the logical choice in providing the vital link between LANs and mainframes. We also planned on much more—flexibility, simplicity and reliability. We provide free, responsive user assistance and guarantee every INS Gateway PC Adapter (hardware and software) for five years.

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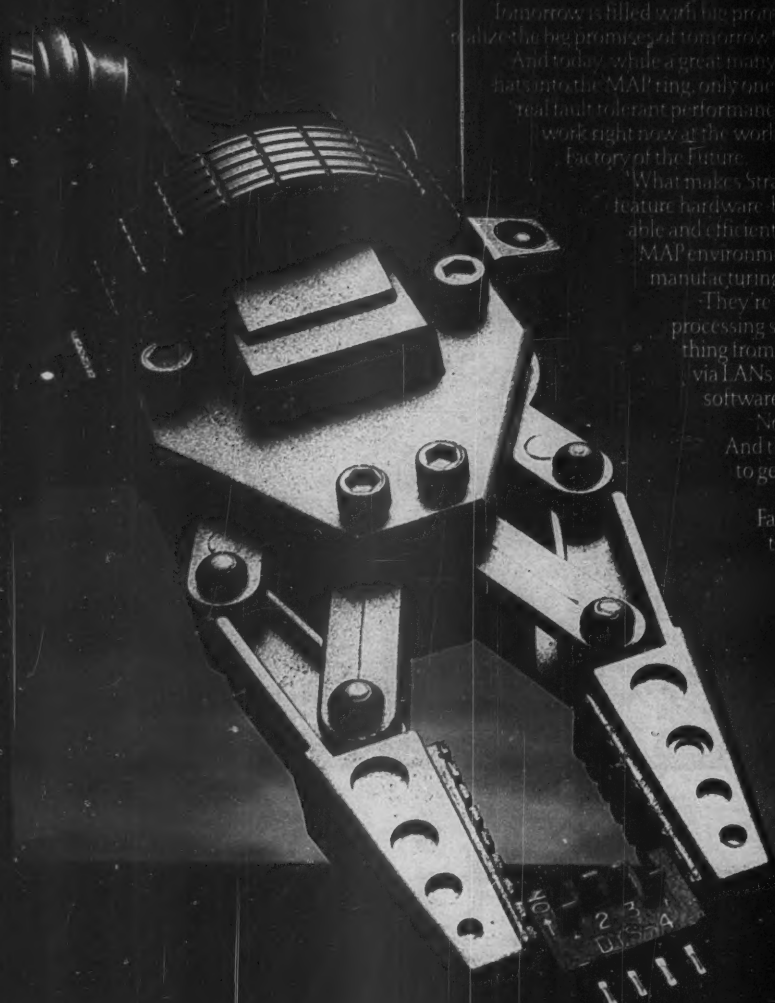
They're extremely powerful, extremely fast transaction processing systems that offer complete connectivity to everything from programmable devices to corporate mainframes, via LANs and WANs. And they support a wide range of software resources.

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Stratus Computers Inc., Marlborough, MA 01752





## NEW PRODUCTS/PRICE REDUCTIONS

Continued from page 134

The VCOM-8 is priced at \$795. The VMEM-4 is priced at \$1,485 in hundred-lot quantities.

SBE, 2400 Bisso Lane, Concord, Calif. 94520.

## PRICE REDUCTIONS

Telesensory Systems, Inc. has reduced the price of its Versabraille II personal computer system for the blind.

Versabraille II, including double disk drives and a forward and backward Grade 2 braille translator, is now priced at \$5,995.

Telesensory Systems, P.O. Box 7455, 455 North Bernardo Ave., Mountain View, Calif. 94043.

Kentrox Industries, Inc. has dropped the price of its T-Serv T1 channel service unit (CSU).

The T-Serv T1 CSU is the required interface between the telephone company-provided 1.544M bit/sec. T1 facility and the customer-owned data terminal equipment.

The T-Serv T1 CSU is now priced at \$1,350.

Kentrox Industries, P.O. Box 10704, Portland, Ore. 97210.

Corporate Microwire, Bank of America National Trust and Saving Association's microcomputer-based wire transfer service for corporate customers, is now available at a reduced price.

In addition to the price reductions, enhancements have been made to increase security, flexibility and speed.

The price of the software service has been reduced to \$1,000, including installation and training. In addition to the cost of the service, there is a \$50 per month maintenance fee and a charge for each transaction.

Corporate Microwire software runs on the IBM Personal Computer XT, PC AT and compatibles.

Bank of America, 555 California St., San Francisco, Calif. 94104.

Informer Computer Terminals, Inc. has announced price reductions for its Model 205 desktop terminals featuring Digital Equipment Corp. VT100 emulation, protocol converter support, integral modems and IBM 3270-style keyboard.

The Model 501E with a 1,200 bit/sec. modem costs \$995. The Model 501C with a 2,400 bit/sec. modem costs \$1,095.

The Model 501D with a 2,400 bit/sec. modem and Microcom, Inc.'s Microcom Networking Protocol costs \$1,195.

The Model 508A dual-emulation desktop terminal also emulates the IBM 3178 and features a 2,400 bit/sec. modem. It costs \$1,695.

Informer Computer Terminals, 22936 Mill Creek Road, Laguna Hills, Calif. 92653.

NCR Corp. has announced lower pricing for its NCR Tower 32, Tower XP and Minitower products as well as for system memory kits, disk drives and I/O controllers.

The base price for the Minitower is now \$5,260.

The base price for the Tower XP is now \$13,675, and the Tower 32 typical configuration now costs \$23,470, the vendor said.

That Tower 32 configuration includes a Motorola, Inc. MC68020 processor, 2M bytes of memory, eight serial ports and one parallel port.

It also includes a 85M-byte fixed disk, 45M-byte cartridge tape drive, 1.2M-byte flexible disk drive and an AT&T Unix System V operating system.

All memory modules now cost \$1.00 per megabyte, according to the vendor.

Tower I/O controllers cost \$1,500, and Tower fixed disk drives are priced from \$2,500 for a 46M-byte drive to \$5,500 for a 140M-byte drive.

NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479.

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Nora Feldman Glidex  
Director of Marketing  
IDEAssociates, Inc.  
Billerica, MA



IDEAssociates, developer and marketer of IBM PC peripherals and a company with 500% growth during its last fiscal year, first started using Computerworld to reach a select audience (MIS/DP). Nora Feldman Glidex, Director of Marketing, soon found that Computerworld attracted much more than just MIS/DP professionals.

"We immediately broadened our advertising objectives. The responses are coming from Computerworld readers in all six of our audiences: the PC end user, the business manager, the retailer, the OEM and VAR sides of the market, and, of course, the MIS/DP executive."

As Nora confirms, "The numbers are in. Computerworld tops its MIS/DP competition hands down."

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# COMPUTER INDUSTRY

Section begins on page 166

## Market for hot computer goods keeps thieves in business

### Crimes hard to detect, solve, law enforcers say

By Ninamary Buba Maginnis

A ready market for stolen computer parts, both in the U.S. and abroad, spurs burglars to meet customer demand, computer crime experts say.

Although the Federal Bureau of Investigation recently arrested an Ohio man in connection with the theft of \$600,000 worth of Digital Equipment Corp. printed circuit boards [CW, Oct. 6], crime specialists concede that such cases are tough to prevent and even tougher to crack.

"In this country there is always a black market for any product — especially if it's small, portable, valuable and in demand," says Jack Bologna, an Adrian, Mich., computer crime consultant with security firms Computer Protection Systems and Odiorne International Consulting. "There is always a network of people interested in making a fast buck."

The U.S. market for stolen hardware generally operates through computer trade magazines. Some companies advertise as repair services, attracting customers with lower prices than manufacturers can reasonably offer, notes Ed Rapacki, assistant district attorney for Middlesex County, Mass.

Rapacki's jurisdiction includes the corporate headquarters of such firms as DEC, Prime Computer, Inc., Apollo Computer, Inc. and Wang Laboratories, Inc.

Mid-range computer hardware, such as printed circuit boards, tape drives, disk drives and heads, is easy to sell through computer magazines, trade journals and parts catalogs. Often the low prices are a good clue that the equipment comes from a questionable source, Rapacki says.

"That middle-level equipment gets shipped out all over the country," he says.

"There are vendors all over the country who will buy and resell them. It's cheaper to deal that way than to get them from the manufacturer."

Rapacki prosecuted a 1985 case in which thefts of Prime boards were traced to Prime employees. Inside theft is believed to be common within the industry.

"Consider how small some of these products are — a printed circuit board can fit in an attache case and be sold for \$20,000," Rapacki ob-

serves. "It doesn't take a rocket scientist to see there's a lot of money to be made at very little risk."

The Prime case was solved when an Arizona reseller realized the board he received in the mail was state-of-the-art, not a reconditioned older model. The suspicious reseller called the company and reported the serial

numbers, which were traced back to Prime's unsold stock, Rapacki recalls.

"There's so much of this going on and it's so difficult to catch them," he says. "Not all intermediate vendors are as honest as the one in Arizona."

The rapid advances in computer technology create a large supply of secondhand systems being sold by companies that upgrade to newer technology, says private investigator Ron DeLia of Boston-based Commercial and Industrial Security.

"That makes it a lot more difficult to detect who is selling stolen goods," DeLia says. Most manufacturers do not keep good records of serial numbers and where hardware should be, he says.

DeLia says the recent arrest in Ohio was unusual because the stolen boards were identified by the manufacturer as belonging to Ohio State University.

Another large market exists overseas. There is an especially strong demand for sophisticated computer hardware in Soviet Block countries.

In late 1983, a DEC VAX-11/782, composed of dual VAX-11/780 computers, was seized by West German authorities minutes before it was scheduled to leave their jurisdiction [CW, Nov. 21, 1983]. The computer was reportedly headed to the Soviet Union.

"There is overseas a very large market for any type of computer equipment," DeLia notes. "And I know DEC has been targeted as far as the Soviet Union is concerned. Their number one priority is DEC equipment."

According to Bologna, a 30-year veteran of law enforcement and corporate security, U.S. market conditions alone do not warrant a rash of computer thefts.

"The economic motives are far greater in Iron Curtain countries than in this country," according to Bologna. "The surge of interest in circuit boards may really have to do with export to the Iron Curtain. It's very difficult to get American computers there."

**"It doesn't take a rocket scientist to see there's a lot of money to be made at very little risk."**

— Ed Rapacki  
Assistant District Attorney  
Middlesex County, Mass.

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Argentina is the second largest computer market in South America and the third largest in Latin America. In 1983, there were 24,200 computers installed, valued at \$421 million (U.S.).

Computerworld Argentina is the publication Argentine computer professionals rely on for all the latest local and international developments in hardware, software, services and office automation. Published twice a month, and modeled after its sister publication in the U.S., Computerworld, Computerworld Argentina circulates to more than 6,000 MIS/DP professionals throughout Argentina.

PC Mundo is published every two months as a supplement to Computerworld Argentina. It is targeted at PC and micro users.

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## COMPUTER INDUSTRY

## Microsoft goes for gold

From page 166

time Microsoft job overseas.

In contrast to those in the U.S., Microsoft's sales of applications abroad have been booming.

In addition to enriching the corporate coffers, all those sales of Microsoft Word and Excel in foreign nations continue to boost Microsoft's confidence that it could happen here, at the departmental level of corporate America.

If Microsoft can repeat Excel's popularity on the

Macintosh (remember Jazz?) with an IBM Personal Computer version, who knows what could happen?

What is becoming increasingly clear is that Microsoft will not be content to simply be the operating system branch of the Big Three micro software tree.

Although it hasn't pursued the acquisition patterns of fellow branches Lotus Development Corp. and Ashton-Tate, Microsoft is every bit as serious about getting bigger faster.

At this pace, Microsoft will crack the quarter-billion-dollar mark in revenue this fiscal year — and should bring a financial smile to the face of even the

most jittery high-tech investor.

In today's corporate raiding climate, the image of financially troubled companies "circling the wagons" has taken on a new meaning.

After sales stall, profits plummet or disappear and jobs are cut, what is the ultimate in humiliation? A hostile takeover — which is precisely what can happen when the firm's stock price heads south as a result of the above factors.

Data General Corp. recently became the latest to round up its wagons with an anti-takeover defense. DG's stock is currently hovering near its 52-week low of 27, down

from a high of 50 during the year. The company adopted a shareholder rights plan intended to cost a potential raider more than a few bucks if it dares to mount a tender offer.

Control Data Corp. recently adopted similar measures. Don't be surprised to see DG bite another bullet and settle out of court with the second plaintiff in its 7-year-old software bundling case, Digidyne Corp.

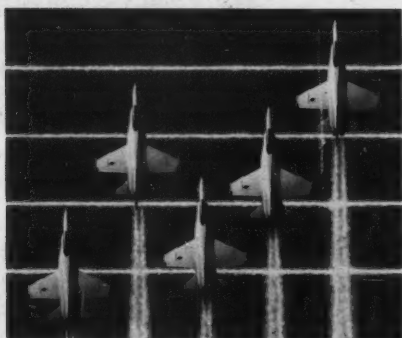
The one-time charge from such a settlement will be painful on the bottom line, as DG's most recent quarter, hit by a \$1.10 per share settlement with Fairchild Semiconductor Corp., will show.

But a protracted legal bat-

tle that DG may not win could cost much more in the long run.

There was more bad news recently for computer vendors awaiting an upturn in U.S. capital spending. The Conference Board reported that the nation's 1,000 largest manufacturers' capital appropriations fell 20% from the first quarter of this year to the second.

For the first six months, appropriations lagged a depressing 27% behind 1985 levels. Actually, we'll probably be hearing these statistics quoted often by vendors seeking scapegoats for third-quarter results that fall short of expectations.



Reducing cost overruns is a priority at the Pentagon these days. As a result, defense contractors are watching every nickel.

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## COMPUTER INDUSTRY



## EXECUTIVE CORNER

Tandon Corp. announced that **H. L. Sparks** has resigned as senior vice-president of sales and marketing.

Zymos Corp. reported that **W. C. Kim**, chairman of Daewoo Corp., has been appointed chairman of the board of the corporation. Also announced was the resignation of **W. Bert Braddock** as president, CEO and director of Zymos.

Tandem Computers, Inc. has consolidated its international sales and marketing operations into a single group, elevating **Jack W. Chapman** to the new post of vice-president of international sales operations. Chapman will be responsible for all Tandem sales and marketing activities outside the U.S.

Uccel Corp. of Dallas announced a realignment of its systems software operation, naming two senior executives to new positions. **Peter J. Baris**, formerly vice-president of corporate development, is now vice-president and general manager of the domestic systems software division. **Paul Newton** moves to the corporate staff as senior vice-president of corporate development. He will be responsible for all of Uccel's product and company acquisitions.

As part of a restructuring of management, **John A. Fahlberg** has been named president and CEO of Zycad Corp. **Richard E. Offerdahl**, one of the founders of the firm, resigned as president, CEO and director.

Gould, Inc. Information Systems in Fort Lauderdale, Fla., announced the promotion of **Patrick L. Rickard** to the position of president and general manager of the firm's computer systems division. Previously, Rickard served as division executive vice-president.

**Peter P. Savage** has been appointed president of Commterm, Inc. of Billerica, Mass. Savage, who joined the company in 1985, directed the development of Commterm's voice processing systems and led the company's efforts to provide systems for large corporate communications networks.

Trilogy Ltd. in San Jose, Calif., announced the appointment of **David W. Dunlap** as vice-president of finance and administration and chief financial officer of the company. Dunlap, who joined the company in 1985 to assist in its restructuring, was chief financial officer of Trilogy Systems, a subsidiary of Trilogy Ltd.

**Fred J. Jensen** has joined Innovative Electronics, Inc. of Miami as president and CEO of the company. Jensen formerly served as the director of international sales for the T-Bar Corp. in Wilton, Conn.

Sequoia Systems, Inc. of Marlborough, Mass., announced the appointment of **William C. Grover** as president and CEO of the company. Previously, Grover served as senior vice-president of Norand Corp. in Cedar Rapids, Iowa.

## Wang forms marketing unit

From page 166

staff," the spokesman said. "Marketing was in three different areas before; we've now consolidated all of that into one."

George Colony, president of Cambridge, Mass., market research firm Forrester Research, Inc., said the shift is the sixth or seventh time Wang has realigned its marketing efforts in the last couple of years.

"It's clear that the firm is in recovery," he noted. "Research and development is back on its feet, sales have come back, but the missing piece has been marketing. With all the people who have left the company, it has

left a marketing shell."

Patty Seybold, editor of the "Seybold Report on Office Systems," however, said marketing is not the firm's primary problem. One of Wang's major shortcomings, she said, is custom-

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**'It's clear that the firm is in recovery.'**

— George Colony  
Forrester Research, Inc.

er and sales support.

"The fact is, the firm does not have a strong operating officer other than Dr. Wang," she said.

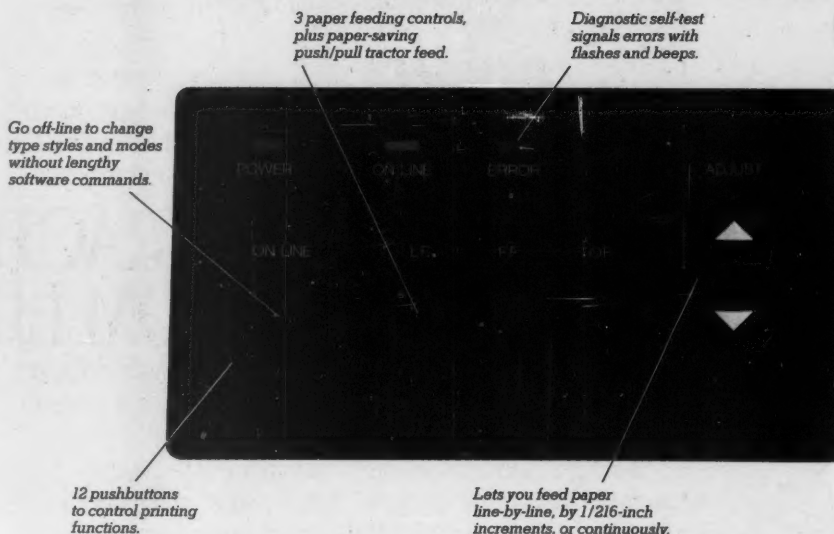
Seybold said the current shift should buoy the firm's marketing ef-

forts. "It is true that once Carl Masi left, there didn't seem to be anyone setting overall product direction," she said. "Dr. Wang said he met with Tsiang and Doretto from time to time to take customer inputs and R&D and collectively make a decision."

Some observers questioned the impact the shift would have on Doretto. One former Wang sales manager who recently left the firm said Doretto was a scapegoat for less than robust sales in the first quarter. "Shipments exceeded bookings by only 5%," he said. "That usually suggests a company on a downhill slope."

Jay Stevens, an analyst with Dean Witter Reynolds, Inc. in New York, said he was surprised by the move. "I'm not sure what happens to Doretto with all this unless they have another role for him that they haven't announced yet," he said.

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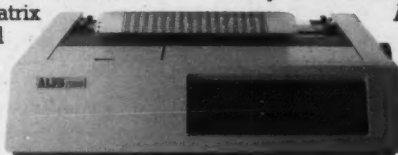
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## COMPUTER INDUSTRY

# Digital Communications acquires micro software firm

## Continues expansion course with Microstuf

By James A. Martin

ALPHARETTA, Ga. — Continuing on its aggressive course of expansion, Digital Communications Associates, Inc. (DCA) last week said it has agreed to acquire Microstuf, Inc., a microcomputer data communications software vendor.

DCA will issue 750,000 new shares of common stock to Microstuf shareholders in exchange for Microstuf shares in a transaction valued at \$15 million. Roswell, Ga.-based Microstuf is a privately held concern, and the

merger is subject to approval by its owners. The transaction is expected to be completed within two weeks.

The acquisition is "all part and parcel of DCA's thrust to position itself as a major mainstream supplier of a full family of data communications products, especially microcomputer products," said Andy Schopick, senior analyst with Gartner Securities, Inc. of Stamford, Conn.

### Other acquisitions

In other such moves this year, DCA acquired Forte Communications, Inc., a micro-to-mainframe vendor, in February and Cohesive Network Corp., a T1 communications vendor, in September.

"They are basically acquiring additional software capabilities to address the microcomputer area, and it is a move that makes a lot of sense," Schopick said.

Although best known for its Irma terminal emulation board, DCA's specialties are in software. The merger enables the company to "get even more into the software end of things," Charles Yarbrough, director of DCA investor relations, said. Microstuf's flagship product is the Crosstalk software program for asynchronous communication among microcomputers.

Initially, Microstuf will become a DCA subsidiary and will most likely be integrated into DCA's personal

computer communications group. At this time, no layoffs or personnel changes are anticipated, according to Yarbrough.

### Earnings increase

Separately, DCA announced last week that its earnings for the first quarter ended Sept. 30 rose 31% on a 14% increase in sales. DCA reported revenue of \$37.2 million, up from \$32.7 million in the first quarter of fiscal 1986.

Net income rose from \$2.7 million to \$3.6 million, despite DCA's \$4 million payment during the quarter to terminate an exclusive distribution agreement with General Datacomm Industries, Inc. of Middlebury, Conn.

DCA said it ended the agreement to get a wider distribution base for Cohesive Network's CN-1 and CN-2 products. DCA's per-share earnings rose from 24 cents to 26 cents.

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## Toshiba to make superchips in West Germany

By Yasuko Yoshimi and Takehisa Kondoh

TOKYO — Toshiba Corp. has announced plans to manufacture 1M-bit dynamic random-access memory (RAM) chips in West Germany by year's end, leading the pack of Japanese semiconductor makers gearing up for the mass production of superchips.

Toshiba's West German chip production facility in Braunschweig is expected to start with a monthly capacity of 100,000 units. The chips will ship to European countries, according to a Toshiba spokesman. Toshiba's West German subsidiary has already been producing about 1.5 million units of 256K-bit dynamic RAM and 64K-bit static RAM chips per month since 1985.

Toshiba is thought to be the first Japanese 1M-bit vendor to produce in volume overseas. Competitors Hitachi Ltd., Mitsubishi Electric Corp. and Matsushita Electronics Corp. are said to be hesitating in foreign chip manufacturing because of the slow-down in demand for semiconductors.

### Next-generation semiconductors

The planned West German production is believed to pit Toshiba against IBM and Siemens AG in the European market for next-generation semiconductors. IBM has already started volume 1M-bit chip production in West Germany.

Siemens, meanwhile, is expanding plans for the superchip as part of its Megaproject, a campaign to bolster the firm's production capabilities for 1M- and 4M-bit memories, and step up its presence in the worldwide semiconductor market.

Siemens joined forces with Toshiba in July 1985 to share research and development on 1M-bit chip and other chip technology.

Kondoh is bureau chief and Yoshimi is editorial assistant in the Asian bureau of the CW Communications International News Service.



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## COMPUTER INDUSTRY

## European firms join to create OSI conformance enterprise

### Trilateral support group meeting also requested

By Marie-Martine Buckens

BRUSSELS — Europe's major communications equipment vendors recently announced the creation of a joint venture for testing the conformance of their equipment with the International Standards Organization's Open Systems Interconnect (OSI) framework. The venture is meant to bring the participating firms closer to ensuring the compatibility of their products.

The eight founders of the venture are Groupe Bull and Thomson SA of France, Britain's International Computers Ltd. PLC., West Germany's Siemens AG and Nixdorf Computer AG, Italy's Ing. C. Olivetti & Co. and STET and N.V. Philips of the Netherlands. All are members of the Standards Promotion and Application Group (SPAG), formed to back

the development of open standards.

The new venture, called SPAG Services, will work to develop OSI testing procedures and software, said Emmanuel de Robien, SPAG vice-president and a director at Groupe Bull. A further step, he said, will be to extend the firms' activities to manufacturing protocols and the Integrated Services Digital Network.

Initial funding will come from the eight founding firms, although the European Community Commission is reportedly shown interest in participating.

In a separate development, de Robien called for a trilateral meeting between U.S., European, and Japanese industry groups that back open systems standards.

The U.S.-based Corporation for Open Systems recently held meetings with SPAG members, then talks with members of the Japanese association POSI.

Buckens is a Brussels correspondent for the CW Communications International News Service.

**The new venture will work to develop OSI testing procedures and software and extend activities to manufacturing protocols and ISDN.**

## Storage Technology approaching end of Chapter 11 bankruptcy protection

### Progress also made toward IRS settlement

By Alan Alper

DENVER — A U.S. Bankruptcy Court here last week declared that Storage Technology Corp.'s (STC) reorganization plan is adequate, setting the stage for the firm's emergence from Chapter 11 protection early next year.

STC, which has been operating under Chapter 11 protection since October 1984, said it would begin soliciting creditors, shareholders and securities holders on Oct. 20 to vote on the reorganization plan. The Creditors Committee approved the plan earlier this year [CW, July 14].

A court hearing is scheduled for Dec. 9 to determine the results of the voting. At that time, the court is expected to approve the plan and set a date for STC to emerge from Chapter 11 protection, the firm said.

"They have not crossed all the hurdles yet, but if you weigh the odds, it's beginning to look a little better for them to successfully emerge from Chapter 11," noted Debra Silversmith, an analyst with Denver investment banking firm Hanifen, Imhoff, Inc.

STC also said last week that it is making progress toward resolving a

dispute with the Internal Revenue Service regarding its past tax liability. In addition, the firm pointed out that under the tax reform bill recently passed by Congress, STC would be allowed to carry its tax losses forward to next year.

The IRS claims STC owes \$267 million in back taxes, while the Louisville, Colo., firm contends its tax liability is only \$3 million.

"We continue to believe the IRS claims lack merit," the STC spokesman said. The firm does not expect the dispute to hinder its emergence from Chapter 11.

A Nov. 17 hearing is scheduled in Bankruptcy Court in Denver to allow the judge to estimate STC's tax liability. "This puts the burden of proof on the IRS," the spokesman noted. STC has said it is putting aside \$55 million in the event it is found liable for additional taxes.

Hanifen, Imhoff's Silversmith said that after consulting with bankruptcy experts, she believed the dispute can be resolved without impacting the reorganization plan.

"They said the case that was closest was the Comdisco, Inc. situation which was resolved in Comdisco's favor," she noted. "So, I feel there is a higher than 50-50 chance it will be resolved within the limit of the creditors' agreement and in Storage Tech's favor."

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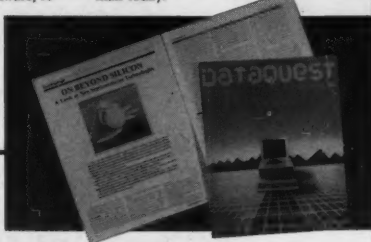
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## COMPUTER INDUSTRY

# Handbook unravels mystery of expert systems applications



## OUTSIDE LINES

Bohdan O. Szuprowicz

Commercial exploitation of expert systems did not really begin until 1983. Since then, at least 150 of the Fortune 500 corporations have spent about \$1 billion on expert systems development.

Details of many expert systems applications continue to be shrouded in secrecy, but the latest issue of the *Expert Systems 1986* handbook, which is published by SELA Technical Publications, helps unravel some

of the mystery.

The handbook identifies 475 expert system implementations throughout the world. According to the authors, more than 1,000 are actually under way, if all systems in planning and research stages are taken into account.

## U.S. way ahead

The U.S. is way ahead in expert systems applications and accounts for 80% of the current global market. However, the UK, France, Japan, West Germany and Italy are rapidly catching up, and by 1987, they are expected to account for 30% to 40% of the worldwide expert systems market.

Commercial applications so far represent less than 10% of all expert system implementations, with advisory and management decision support systems accounting for about half of the applications.

Financial planning and services is the next largest user category, with 11 systems identified. Several marketing, risk analysis and insurance applications are also already in place. Financial and business management may have the potential to become the largest expert systems applications market in the very near future because of an explosion of expert systems development and applications software for microcomputer end users.

Professional applications represent the largest percentage of all expert systems implementations, accounting for 35% of the total.

Of those, almost 70% are in medicine. Because medical knowledge is vast, widely scattered and often difficult to interpret, medicine is particularly well suited to expert systems applications.

## Education, instruction

Education, training and computer-aided instruction represent the second largest use of expert systems in professional applications. These systems are especially useful in keeping track of how people with differing backgrounds and educations approach and solve specific problems.

These expert systems range from teaching geography to explaining the laws of physics. Expert systems leading to computer-aided software engineering and automatic programming are seen as among the most promising in this category.

Other professional expert systems have been identified in engineering, chemistry, mathematics, agriculture, sciences, weather forecasting, publishing and law.

## Military applications numerous

It is the military establishment that accounts for the second largest overall number of expert systems in a single discipline. More than 12% of all expert systems are currently used for military, aerospace and transportation environments, and it is estimated that military forces alone present a potential for at least 100 different expert system applications.

Industrial expert systems now account for 28% of the total, but these represent a dozen different industry applications.

By far the most numerous are very large-scale integration electronic circuit design systems in computer-aided engineering (CAE) applications, which are becoming so complex that human beings are unable to keep track of all the details necessary to design a circuit.

Although CAE and computer-aided design and manufacturing data bases are seen as major industrial expert system application areas, the diagnosis of machine malfunctions and maintenance of complex equipment is expected to use more expert systems than any other industrial application. Maintenance and diagnostic procedures involve many rule-based applications and judgment decisions and are ideally suited for the purpose.

Petroleum and mineral resources exploration, one of the earliest expert system applications, is the third largest user domain in the industry. It is believed that most oil companies are currently developing complex expert systems today while the industry is in a slump. When oil prices eventually increase, major companies hope to increase their productivity with expert systems to allow operation with considerably smaller work forces than in previous years.

## Breaking the 640K DOS Barrier:

New version of Alslys PC AT Ada compiler improves speed, adds application developer's guide, brings seven 80286 machines to latest validation status.



Alslys' landmark Ada compiler for the PC AT, the first to bring Ada to popular-priced microcomputers, has been upgraded to Version 1.2 with significant improvements.

The new version compiles faster than its predecessor, is validated for a full range of popular compatibles using the latest AJPO test suite 1.7, and includes a Developer's Guide in the documentation set. The price remains at \$2,995 for single units, including a 4 megabyte RAM board.

Both the original and the newly upgraded versions utilize the inherent capabilities of the 80286 chip and "virtual mode" to eliminate the 640K limitations of DOS. These techniques permit addressing up to 16 MB of memory, under the control of DOS, without changes to DOS in any way!

80286 machines validated in the new release include HP's Vectra, Compaq's Deskpro 286, Sperry's PC/IT, Zenith's 200 series (including the Z-248), Tandy's 3000 HD, the Goupil/40, and the IBM PC AT. The compiler supports DOS 3.0 or higher. Ada programs compiled on the AT will also run on PCs and XT's supporting DOS 2.1 or higher.

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Szuprowicz is president of 21st Century Research of North Bergen, N.J., and publisher of Supergrowth Technology USA.



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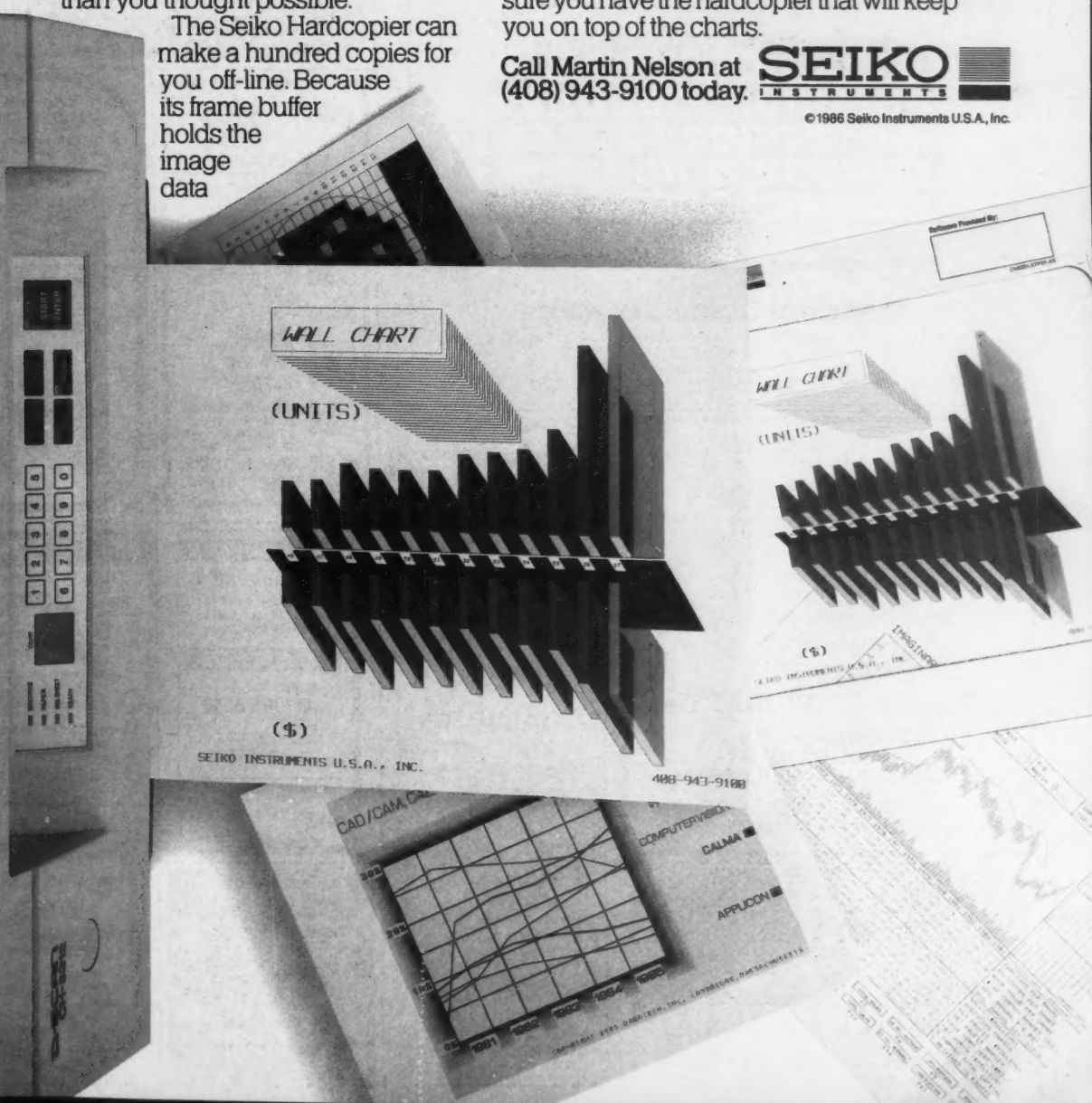
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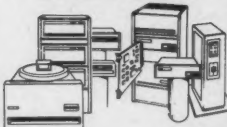
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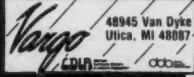
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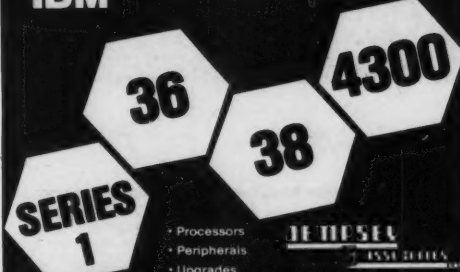
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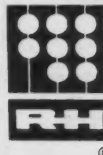
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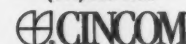
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Infotron Systems is a manufacturer of statistical and time-division multiplexers, network concentrators, intelligent switching systems, and network management systems. To Ed DiMingo, Director of Corporate Communications, it's important for Infotron to have high visibility among data communications professionals. So when Infotron introduced its newest product, the InfoStream™ 1500 T1 voice and data multiplexer, he chose Computerworld as the major vehicle for getting the message to the right people — network managers, voice and data managers, and MIS/DP directors.

Ed explains just how he knows their message is being read. "I put together a list of data communications buyers and influencers. And for the past two years, I've polled these people to find out what they read most. Computerworld always leads the way. In fact, in the most recent study, Computerworld came in way above the others at 68%, with Datamation at 51% and Data Communications at 23%."

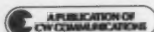
In fact, Ed's own readership studies were reinforced by results of a recent Starch study. "Our InfoStream ad ranked in the top 10 percentile for 'read most' among all advertise-

ments studied in the issue. There's a real need for T1 information in the communications field among Computerworld's readers, and our message got to these people."

Computerworld. We're helping more suppliers reach more buyers more often. We cover the entire computer market. Every week. We deliver the news, the analysis, and the audience. Just ask Ed DiMingo. Call your Computerworld representative for all the facts. Or call Ed Marecki, Vice President/Sales, at (617)879-0700.

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## COMPUTER INDUSTRY

## Hitachi eyes U.S. mainframe market; may sell directly in '87

By Takehisa Kondoh

TOKYO — Sources within Hitachi Ltd. say the Japanese electronics giant will break into direct sales in the U.S. computer market in the near future by moving into mainframe production at its recently opened manufacturing plant in Norman, Okla.

As a first step, Hitachi may start delivering workstations and other low-end systems to U.S. users in early 1987. A Hitachi official who asked to remain anonymous predicted that the production line at the Oklahoma site would expand eventually to include large-capacity magnetic disks and processors.

The plan could possibly spell an end to Hitachi's years of OEM shipments to the U.S. mainframe market under its current deal with National Advanced Systems, Inc. (NAS) of Mountain View, Calif., the mainframe subsidiary of National Semiconductor Corp. NAS officials could not be reached for comment before press time.

### 'Do what they do best'

One analyst who follows the IBM plug-compatible market said it would make little sense for Hitachi to sell directly in the U.S. under its own label. "In a market this size, it takes an extraordinary amount of investment and time to build a sales force," said Bob Djurdjevic of Annex Research, Inc. in Phoenix. "I think Hitachi will continue to do what they do best — produce good technology and have others sell it. NAS is by far their highest volume distributor in the world."

Details of Hitachi's planned U.S. production have yet to be revealed. But a Hitachi spokesman predicted that the Oklahoma operation would spark a wave of computer activities in the U.S.

"Our dream is to establish our own systems brand [in the U.S.]," the spokesman said. He added that the facility would provide Hitachi with a strategic base to bite into the entire U.S. computer market.

Except for its M mainframe series, which has been delivered to American users through NAS, Hitachi has shipped no computers or software products to the U.S. directly. A similar

policy is maintained by Fujitsu Ltd., a plug-compatible competitor, which supplies its mainframes under an OEM contract with Amdahl Corp.

A spokesman for Tarrytown, N.Y.-based Hitachi America, Inc. said no decisions have been made regarding what Hitachi may eventually manufacture at the Oklahoma plant. "We established a product marketing team to study the feasibility of what kind of product we want to handle in the U.S.," spokesman Sam Nishikawa said. "We have no concrete plans."

Hitachi established a subsidiary, Hitachi Computer Products, in Norman, Okla., last November. The subsidiary is scheduled to produce magnetic disks starting in April 1987, with optical disks and peripherals to follow.

Since the beginning of this year, Hitachi has increased its sales pitch for mainframes. Last summer, the M-680 series of high-end mainframes, Hitachi's competitor to IBM's 3090, began to ship overseas through OEM agreements with NAS, Italy's Ing. C. Olivetti & Co. and West Germany's BASF.

Hitachi's overseas release of the M-680 was accompanied by the firm's shipment of its H6585 5G-byte mainframe disk storage system, pitted against IBM's 3380 Model E drive. Hitachi, along with IBM, was one of the first vendors to ship 5G-byte-class magnetic disks.

Although an IBM-compatible manufacturer, Hitachi is fast gaining independence in mainframe technology. The vendor has reportedly decided to partially port AT&T's Unix System V operating system to its mainframe systems, allowing users simultaneous use of IBM's OS and Unix.

Sources revealed that Hitachi would port an original Unix-based operating system for future mainframes and workstations for delivery to the U.S. market. Hitachi only confirmed, however, that it would introduce "the most popular operating system in the U.S. at this moment."

Kondoh is Asian bureau chief of the CW Communications International News Service. Computerworld Senior Editor Clinton Wilder contributed to this story.

## NCR looks strong in wake of dramatic market plunge



### ACTIVE ISSUES

Kathy Porteus

As investors look for opportunities after last month's dramatic stock market slide, some fingers point to NCR Corp. (NCR — 47 1/2).

NCR traded in the mid-50s prior to the infamous week of Sept. 8, during which the stock fell more than four points. Recently, NCR shares have sold in the range of 46 to 48.

"These subtle aberrations in the stock's price trend are always buying opportunities," says Peter Labe, analyst with the Drexel Burnham Lambert Group. "What's important is that NCR will outperform the economic environment and is a genuine growth stock."

Labe says NCR is less susceptible to sluggish industry conditions because its markets are generally within the service sector, rather than in economically sensitive markets such as manufacturing. Taking new tax legislation into account, Labe estimates NCR will earn \$3.50 per share in fiscal 1986, ending Dec. 31, and \$4.00 per share in 1987.

Tapping new sources of revenue is considered important to NCR as its traditional business in financial and retail markets matures. According to Stephen Dube, an analyst with Shearson Lehman Brothers, Inc., NCR's sales from these markets have grown at only a 5% annual rate during the past decade.

Dube says the keys to NCR's future revenue growth are its Tower product line, micros used in networking environments and the new 9800 on-line transaction processing system and its derivatives.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Labe said NCR "can demonstrate a 10% revenue growth pattern from its financial, retail and general-purpose computers" and will benefit from newer product areas such as office automation and semiconductors in addition to the 9800.

Beyond confidence in NCR's growth, analysts point to the company's consistent earnings gains, stable profit margins and strong financial position. Labe says brilliant management has achieved a financial balance sheet that is perhaps the best in the computer industry.

Furthermore, Labe continues, "management is intent on enriching shareholder value." Since beginning its stock repurchase program eight years ago, NCR has bought back 27 million shares.

Both Labe and Shearson's Dube say NCR's stock is undervalued. "I believe the stock deserves a market multiple to a slight premium," Dube says. "In the context of 1987, this suggests NCR should trade around 13 to 14 times earnings."

Dube estimates NCR will earn, depending on its final tax rate, between \$3.60 and \$3.75 per share in 1986 and between \$4.20 and \$4.40 per share in 1987.

Not everyone is in NCR's camp, however. According to Don Young, analyst with Sanford C. Bernstein & Co., investors pay a premium for NCR because it is so well managed. But, he warns, "things can only go wrong when everyone expects everything to go right."

"I will worry about the current value attached to NCR's stock," Young says, "until the company can accelerate revenue growth; yet the visibility of this is not clear."

Although Young says he believes NCR will be successful selling the 9800 system to its traditional markets, he questions whether other markets will supply enough incremental business to provide the growth NCR needs.

Young estimates NCR could earn in the range of \$4.00 per share in 1987 because improvements in the company's operating margins are possible.

## Burroughs-Sperry job cuts announced

From page 166

tives in an early retirement plan," said E. F. Hutton & Co. analyst Michael Geran. IBM recently announced a plan to cut 8,000 jobs in the U.S. next year [CW, Sept. 15].

Eligible Burroughs and Sperry employees will have 30 days from Oct. 17 to elect early retirement. In addition to layoffs, the company will eliminate an unspecified number of jobs through attrition and selected hiring freezes.

The spokesman said nothing is really excluded from departments targeted for reductions, but Geran said he would be surprised to see

marketing jobs affected.

"They would be crazy to cut marketing at this time in the industry," he said.

### Cost reduction plan expected

Industry followers had widely expected some type of major cost reduction plan for the merged company, which Burroughs incurred \$2.9 billion in debt to create.

"With the pricing levels and margin pressures in the mainframe industry now, controlling overhead has become very important," Geran said.

Burroughs has already begun eyeing various parts of the business for sale, recently placing Sperry's Aerospace and Marine Group on the selling block.

Burroughs and Sperry shareholders officially approved the merger last month.

## Harris chip sector lays off 500

By James A. Martin

MELBOURNE, Fla. — Harris Corp., suffering from continued sluggishness in the semiconductor market, said last week it will discontinue 500 jobs throughout its semiconductor sector.

The staff reductions, effective this week, are aimed at downsizing the sector's 5,000-member work force by 10% with across-the-board layoffs.

"The semiconductor industry has been burdened with worldwide overcapacity, weak demand and aggressive price cutting," said Jon E. Cornell, sector senior vice-president. "The improvement in demand in the early months of 1986 has not developed into a firm trend, and the out-

look for the remainder of 1986, as well as 1987, indicated a slower rate of growth than was anticipated."

In addition, another 100 sector employees will be reassigned, either to other positions within the sector or to jobs within other Harris divisions, according to Cornell.

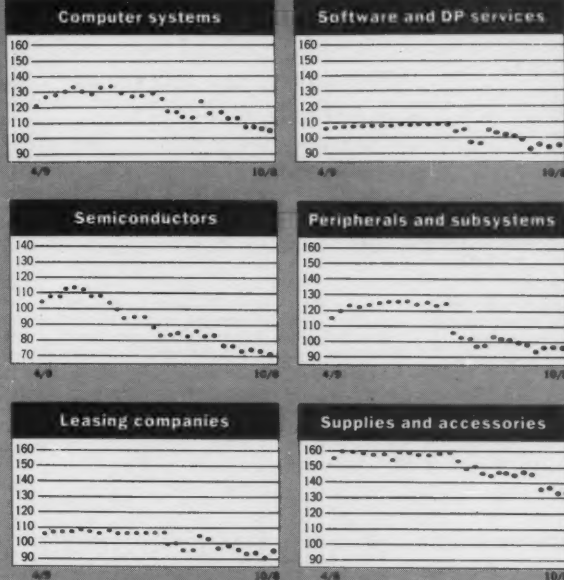
Semiconductor sales in fiscal 1986, ended June 30, were \$292 million, compared with \$273 million the previous year. The sector lost \$4.7 million, however, compared with an income of \$6.4 million in fiscal 1985.

So far this year Harris has laid off about 150 employees in its government systems sector and shut down a Georgia production plant, eliminating about another 140 jobs.



### Computerworld stock trading index

MITCHELL I. HAYES



All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

|                                     | 10/1/86 | 10/8/86 |
|-------------------------------------|---------|---------|
| Computer systems                    | 107.2   | 106.3   |
| Software and DP services            | 93.2    | 95.1    |
| Peripherals and subsystems          | 96.9    | 96.4    |
| Supplies and accessories            | 131.5   | 131.7   |
| Semiconductors                      | 73.1    | 70.5    |
| Leasing companies                   | 90.8    | 95.7    |
| CW stock index                      | 111.2   | 111.3   |
| Standard and Poor's 500 stock index | 139.7   | 141.6   |

## Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, OCTOBER 8, 1986

| X<br>C<br>H |                          | PRICE                   |                        |                       |                       | X<br>C<br>H |                        | PRICE                    |                        |                       |                       | X<br>C<br>H |       | PRICE                    |                            |                       |                       | X<br>C<br>H |      |       |
|-------------|--------------------------|-------------------------|------------------------|-----------------------|-----------------------|-------------|------------------------|--------------------------|------------------------|-----------------------|-----------------------|-------------|-------|--------------------------|----------------------------|-----------------------|-----------------------|-------------|------|-------|
|             |                          | 52-WEEK<br>RANGE<br>(1) | CLOSE<br>OCT 8<br>1986 | WEEK<br>NET<br>CHANGE | WEEK<br>PCT<br>CHANGE |             |                        | 52-WEEK<br>RANGE<br>(1)  | CLOSE<br>OCT 8<br>1986 | WEEK<br>NET<br>CHANGE | WEEK<br>PCT<br>CHANGE |             |       | 52-WEEK<br>RANGE<br>(1)  | CLOSE<br>OCT 8<br>1986     | WEEK<br>NET<br>CHANGE | WEEK<br>PCT<br>CHANGE |             |      |       |
|             | COMPUTER SYSTEMS         |                         |                        |                       |                       |             | SOFTWARE & DP SERVICES |                          |                        |                       |                       |             |       | PERIPHERALS & SUBSYSTEMS |                            |                       |                       |             |      |       |
| O           | ALPHA MICROSYSTEMS       | 8                       | 4                      | 6.63                  | +0.1                  | +1.9        | O                      | ADVANCED COMP TECH       | 7                      | 3                     | 5.00                  | +0.3        | +6.7  | A                        | AM INTL INC                | 9                     | 4                     | 5.25        | -0.1 | -2.3  |
| X           | ALTRON COMPUTER SYS      | 11                      | 20                     | 11.00                 | -0.1                  | -0.8        | O                      | ADVANCED SVS INC         | 19                     | 12                    | 12.88                 | +0.4        | +2.8  | O                        | AMER SVS COBSSON INC       | 9                     | 4                     | 2.75        | -0.1 | -3.6  |
| X           | AMDAHL CORP              | 22                      | 10                     | 20.50                 | -0.6                  | -3.0        | N                      | AGS COMPUTERS INC        | 25                     | 14                    | 18.25                 | +0.0        | +0.0  | O                        | AST RESH INC               | 10                    | 11                    | 12.50       | +0.0 | +0.0  |
| O           | APOLLO COMPUTER INC      | 18                      | 10                     | 13.86                 | +1.4                  | +11.0       | O                      | AMERICAN MGMT SVS INC    | 20                     | 9                     | 15.00                 | +0.3        | -1.6  | O                        | AUTOTROL CORP              | 33                    | 6                     | 1.63        | -0.1 | -0.1  |
| X           | APPLE COMPUTER INC       | 11                      | 34                     | 13.10                 | -0.1                  | -0.8        | N                      | AMERICAN SVS INC         | 11                     | 12                    | 27.75                 | -0.1        | -1.0  | X                        | AVANTAGE GRADE COMPUTING   | 13                    | 16                    | 1.13        | -0.1 | -0.1  |
| X           | AT&T                     | 26                      | 20                     | 22.75                 | -0.8                  | -3.2        | N                      | ANACOM INC               | 7                      | 3                     | 4.25                  | +0.5        | +13.3 | O                        | BANCTEC INC                | 13                    | 6                     | 8.25        | +0.8 | +10.0 |
| X           | BURROUGHS CORP           | 76                      | 52                     | 69.13                 | -0.5                  | -0.7        | O                      | ANALYSTS INTL CORP       | 10                     | 8                     | 5.44                  | +1.4        | +36.0 | N                        | BOLT BERANER & NEWMAN      | 48                    | 29                    | 41.25       | -1.5 | -3.5  |
| X           | P P T CORP               | 1                       | 1                      | 66.3                  | -0.1                  | -0.1        | O                      | ASHTON TATE              | 10                     | 10                    | 10.38                 | -0.3        | -2.4  | O                        | COMPTONICS DATA CORP       | 1                     | 1                     | 1.00        | -0.1 | -0.1  |
| N           | COMPAQ COMPUTER CORP     | 2                       | 1                      | 15.3                  | -0.3                  | -1.8        | O                      | ASK COMPUTER SVS INC     | 15                     | 8                     | 10.50                 | -0.1        | -1.2  | A                        | CETEC CORP                 | 9                     | 6                     | 5.81        | +0.0 | +0.0  |
| X           | COMDEX CORP              | 2                       | 2                      | 7.83                  | +0.0                  | +0.0        | O                      | ASTRODYNE CORP           | 39                     | 24                    | 18.81                 | -0.3        | -1.4  | O                        | COGNITRONICS CORP          | 6                     | 3                     | 2.88        | +0.0 | +0.0  |
| O           | CONCURRENT CORP          | 25                      | 1                      | 14.23                 | +0.3                  | +1.6        | N                      | ATOMIC DATA PROC         | 39                     | 24                    | 1.51                  | -0.3        | -1.7  | O                        | COMINGRAPHIC CORP          | 29                    | 16                    | 20.00       | +0.0 | +0.0  |
| O           | CONTROL DATA CORP DEL    | 2                       | 2                      | 26.86                 | +0.9                  | +3.3        | O                      | COMPUTER ASSOC INTL INC  | 25                     | 10                    | 22.75                 | +0.0        | +0.0  | N                        | COMPUTERVISION CORP        | 19                    | 19                    | 12.75       | -0.4 | -2.9  |
| X           | COMTECH TECH             | 5                       | 5                      | 5.36                  | -0.1                  | -1.9        | O                      | COMPUTER HORIZONS CORP   | 15                     | 6                     | 10.00                 | +0.0        | +0.0  | O                        | CONCORP CORP               | 18                    | 11                    | 4.25        | -0.1 | -0.1  |
| N           | CRAY RESH INC            | 100                     | 46                     | 78.38                 | +0.4                  | +0.5        | O                      | COMPUTER NETWORK TECH    | 10                     | 2                     | 4.81                  | -0.3        | -4.9  | O                        | DATAPRODUCTS CORP          | 13                    | 8                     | 2.95        | -0.1 | -0.1  |
| O           | DAISY SVS INC            | 32                      | 8                      | 7.88                  | -0.6                  | -7.4        | N                      | COMPUTER SCIENCES CORP   | 40                     | 23                    | 31.00                 | -0.3        | -0.8  | A                        | DATARAM CORP               | 18                    | 6                     | 8.13        | -0.1 | -1.5  |
| X           | DATA GEN CORP            | 96                      | 97                     | 10.00                 | +0.0                  | +0.0        | O                      | COMPUTER TASK GROUP INC  | 19                     | 11                    | 3.50                  | +0.1        | +2.9  | O                        | DATACORP CORP              | 7                     | 5                     | 4.75        | +0.0 | +0.0  |
| N           | DATAPPOINT CORP          | 9                       | 5                      | 7.75                  | +0.4                  | +5.1        | O                      | COMPUTONE SVS INC        | 6                      | 1                     | 0.94                  | +0.1        | +7.2  | N                        | DATUM INC                  | 7                     | 5                     | 4.75        | +0.0 | +0.0  |
| N           | DIGITAL EQUIP CORP       | 105                     | 52                     | 82.00                 | +2.1                  | +2.4        | O                      | COMSHARE INC             | 16                     | 9                     | 12.50                 | +0.0        | +0.0  | N                        | DECISION SVCS INC          | 15                    | 8                     | 9.63        | +1.4 | +16.7 |
| X           | ELECTRONIC ASSOC INC     | 10                      | 5                      | 5.13                  | +0.0                  | +0.0        | O                      | CUNEIF SOFTWARE INC      | 10                     | 1                     | 0.50                  | -0.1        | -1.0  | O                        | DEKOR INC                  | 1                     | 1                     | 5.00        | +0.0 | +0.0  |
| X           | FLOATING POINT SVS INC   | 46                      | 12                     | 12.13                 | -0.5                  | -4.0        | O                      | CYCLARE SVS INC          | 17                     | 9                     | 9.13                  | -1.3        | -12.0 | O                        | EVANS & SUTHERLAND         | 27                    | 17                    | 21.00       | +0.0 | +0.0  |
| X           | GOLD INC                 | 20                      | 38                     | 20.38                 | -0.1                  | -0.5        | O                      | DUCQUESNE SVS INC        | 31                     | 11                    | 30.75                 | +1.3        | +4.2  | N                        | FLOATING POINT SVS INC     | 46                    | 12                    | 12.13       | -0.5 | -4.0  |
| N           | HARRIS CORP DEL          | 36                      | 22                     | 28.63                 | -0.3                  | -0.9        | O                      | GENERAL ELEC CO          | 33                     | 13                    | 73.50                 | +0.0        | +0.0  | O                        | GANDALF SVS INC            | 14                    | 5                     | 4.75        | +0.0 | +0.0  |
| X           | HEWLETT PACKARD CO       | 30                      | 29                     | 28.63                 | -0.6                  | -1.6        | N                      | GENERAL MTRS CORP        | 50                     | 33                    | 33.78                 | +1.3        | -3.6  | N                        | GENERAL DATACOM INC        | 15                    | 8                     | 9.00        | +0.5 | +5.9  |
| X           | HONEYWELL INC            | 87                      | 59                     | 70.25                 | -0.9                  | -1.3        | N                      | GTE CORP                 | 36                     | 25                    | 56.25                 | +2.6        | +6.1  | O                        | HAZELTONE CORP             | 10                    | 10                    | 10.88       | +0.1 | +0.6  |
| N           | IBM                      | 162                     | 124                    | 127.50                | -5.5                  | -4.1        | O                      | HOGAN SVS GROUP INC      | 12                     | 5                     | 10.75                 | +0.5        | +4.9  | O                        | ICOT CORP                  | 6                     | 3                     | 0.25        | -0.1 | -0.1  |
| O           | IFL SVS INC              | 4                       | 1                      | 2.25                  | +0.0                  | +0.0        | O                      | INFORMATION SCIENCES INC | 4                      | 1                     | 1.63                  | +0.1        | +4.0  | O                        | INFORMATION INTL INC       | 18                    | 10                    | 24.13       | +0.1 | -0.9  |
| O           | ITT CORP                 | 60                      | 31                     | 62.25                 | +0.0                  | +0.0        | O                      | INFOTRON SVS CORP        | 19                     | 13                    | 8.50                  | +0.5        | +5.9  | N                        | INTECOM INC                | 12                    | 31                    | 4.44        | +0.1 | +0.1  |
| N           | M A COM INC              | 19                      | 13                     | 14.50                 | +0.8                  | +5.5        | O                      | KEANE INC                | 16                     | 8                     | 6.75                  | +0.5        | +8.0  | O                        | INTERLEAF INC              | 15                    | 8                     | 9.00        | +0.3 | -2.9  |
| N           | MATSUSHITA ELEC INDL LTD | 118                     | 54                     | 114.75                | +1.3                  | +1.1        | N                      | LOGIDON INC              | 43                     | 24                    | 27.13                 | +2.1        | +8.5  | O                        | MESADATA CORP              | 5                     | 2                     | 2.38        | +0.0 | +0.0  |
| X           | MENTOR GRAPHICS CORP     | 1                       | 1                      | 0.38                  | -0.1                  | -0.8        | N                      | LOTUS DEV CORP           | 16                     | 25                    | 18.25                 | +0.2        | +1.6  | N                        | MUSI DATA CORP             | 11                    | 8                     | 3.38        | -0.9 | -1.1  |
| N           | MOHAWK DATA SCI CORP     | 1                       | 1                      | 2.50                  | -0.3                  | -9.1        | O                      | MANAGEMENT SCI AMER      | 16                     | 8                     | 11.75                 | -0.3        | -2.1  | N                        | NASHUA CORP                | 28                    | 12                    | 24.38       | +1.5 | +6.6  |
| N           | NBS COMM CORP            | 1                       | 1                      | 1.25                  | +0.0                  | +0.0        | O                      | MANITEX CORP             | 13                     | 7                     | 7.50                  | +0.4        | +5.3  | O                        | NETWORK SVS CORP           | 25                    | 10                    | 12.00       | -1.8 | -12.7 |
| N           | NCR CORP                 | 57                      | 32                     | 45.75                 | -2.4                  | -4.9        | O                      | MICOM SVS INC            | 10                     | 10                    | 10.13                 | +0.0        | +0.0  | N                        | NORTH AMERICA PHILIPS CORP | 42                    | 32                    | 37.63       | -0.3 | -3.3  |
| N           | PRIME COMPUTER INC       | 28                      | 15                     | 17.25                 | -1.5                  | -8.0        | O                      | MICRO PRD DATA CORP      | 4                      | 2                     | 2.13                  | -0.1        | -5.6  | N                        | NORTHERN TELECOM LTD       | 38                    | 25                    | 28.75       | +0.4 | +1.3  |
| X           | RAYON CORP               | 24                      | 15                     | 20.75                 | +0.0                  | +0.0        | O                      | MICROFT CORP             | 36                     | 26                    | 36.00                 | +0.0        | +0.0  | O                        | KOWELL INC                 | 24                    | 11                    | 19.25       | +1.0 | +1.8  |
| O           | STRATUS COMPUTER         | 26                      | 16                     | 19.50                 | -2.3                  | -10.3       | O                      | NATIONAL DATA CORP       | 26                     | 13                    | 21.00                 | -0.9        | -4.2  | O                        | KRATON INC                 | 11                    | 5                     | 6.38        | -0.0 | -0.0  |
| O           | SYMBIOS INC              | 16                      | 5                      | 3.38                  | -0.1                  | -2.3        | O                      | ON LINE SOFTWARE INT     | 16                     | 6                     | 10.75                 | -0.8        | -6.5  | N                        | NARADYNTE CORP             | 11                    | 25                    | 5.50        | +0.0 | +0.0  |
| X           | TANDAM COMPUTERS INC     | 35                      | 18                     | 35.25                 | +1.0                  | +3.9        | O                      | ORACLE SVS INC           | 25                     | 13                    | 25.00                 | +0.1        | +0.4  | O                        | PARSONS ASSOC INC          | 12                    | 11                    | 19.88       | +0.0 | +0.0  |
| X           | TANDY CORP               | 45                      | 31                     | 53.25                 | +1.0                  | +3.1        | N                      | PANOSPHIC SVS INC        | 36                     | 18                    | 28.63                 | +0.1        | +0.4  | N                        | PLESSEY PLC                | 38                    | 19                    | 25.00       | -0.5 | -2.0  |
| X           | TEXAS INSTRS INC         | 148                     | 88                     | 111.75                | +2.8                  | +2.5        | N                      | PLANNING RESH CORP       | 24                     | 14                    | 20.00                 | +0.3        | +1.2  | O                        | PRINTRONIX INC             | 15                    | 11                    | 11.88       | +0.0 | +0.0  |
| X           | ULTIMATE CORP            | 1                       | 1                      | 14.50                 | -1.3                  | -9.0        | O                      | POLICY MGMT SVS INC      | 24                     | 17                    | 24.75                 | +0.3        | +1.2  | O                        | RAI CORP                   | 15                    | 17                    | 19.88       | +0.0 | +0.0  |
| A           | WANG LABS INC - B        | 23                      | 12                     | 12.38                 | -0.5                  | -3.9        | O                      | PROGRAMMING & SVS INC    | 11                     | 5                     | 8.50                  | -0.3        | -2.9  | O                        | RAMTEC CORP                | 7                     | 2                     | 4.13        | -0.5 | -10.8 |
| X           | WANG LABS INC - C        | 23                      | 11                     | 12.38                 | -0.6                  | -4.8        | O                      | REYNOLDS & REYNOLDS CO   | 42                     | 19                    | 38.25                 | +1.5        | +4.5  | N                        | RECOGNITION EQUIP LTD      | 17                    | 9                     | 11.75       | -0.8 | -6.0  |
| N           | XEROX CORP               | 72                      | 46                     | 50.00                 | +1.6                  | +3.0        | O                      | SCIENTIFIC COMPUTING INC | 9                      | 5                     | 9.00                  | +2.5        | +2.8  | O                        | RESEARCH SVS INC           | 15                    | 9                     | 15.88       | +0.8 | +8.8  |
|             |                          |                         |                        |                       |                       |             | O                      | SEI CORP                 | 28                     | 15                    | 18.25                 | +1.5        | +4.0  | O                        | SCAN TRON CORP             | 19                    | 10                    | 11.75       | -0.1 | -0.8  |
|             |                          |                         |                        |                       |                       |             | O                      | SHIELD MED SVS INC       | 25                     | 19                    | 33.38                 | +1.9        | +5.8  | N                        | SCIENTIFIC ATLANTA INC     | 15                    | 9                     | 8.88        | -0.1 | -1.4  |
|             |                          |                         |                        |                       |                       |             | O                      | SOFTWARE AG SYSTEMS INC  | 22                     | 13                    | 15.50                 | +0.0        | +0.0  | O                        | SEAGATE TECHNOLOGY         | 15                    | 8                     | 21.13       | +0.1 | -5.6  |
|             |                          |                         |                        |                       |                       |             | O                      | SOFTWARE PUBLG CORP      | 10                     | 5                     | 5.50                  | +0.5        | +10.0 | N                        | STORAGE TECHNOLOGY         | 7                     | 1                     | 21.13       | +0.1 | -1.4  |
|             |                          |                         |                        |                       |                       |             | O                      | STERLING SOFTWARE INC    | 16                     | 11                    | 16.00                 | +0.1        | +1.6  | O                        | STRATUS SYSTEMS INC        | 29                    | 11                    | 12.13       | +0.0 | +0.0  |
|             |                          |                         |                        |                       |                       |             | N                      | UCCEL CORP               | 24                     | 13                    | 22.75                 | +0.3        | -1.1  | A                        | T-BAR INC                  | 7                     | 5                     | 5.50        | +0.4 | +7.3  |
|             |                          |                         |                        |                       |                       |             | N                      | URUP CORP                | 18                     | 10                    | 15.13                 | -0.3        | -1.6  | A                        | TAB PRODS CO               | 15                    | 10                    | 13.00       | -0.8 | -5.5  |
|             |                          |                         |                        |                       |                       |             | O                      | VM SOFTWARE INC          | 22                     | 17                    | 28.00                 | +1.5        | +5.7  | O                        | TADON CORP                 | 7                     | 5                     | 5.00        | +0.0 | +0.0  |
|             |                          |                         |                        |                       |                       |             |                        |                          |                        |                       |                       |             | A     | TEC INC                  | 8                          | 4                     | 5.40                  | -0.3        | -5.3 |       |
|             |                          |                         |                        |                       |                       |             |                        |                          |                        |                       |                       |             | N     | TEKTRONIX INC            | 65                         | 47                    | 60.88                 | -0.3        | -0.4 |       |
|             |                          |                         |                        |                       |                       |             |                        |                          |                        |                       |                       |             | O     | TELEVISION SVS INC       | 2                          | 2                     | 2.00                  | +0.0        | +0.0 |       |
|             |                          |                         |                        |                       |                       |             |                        |                          |                        |                       |                       |             |       |                          |                            |                       |                       |             |      |       |

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON;  
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER; S=SPLIT

| LEASING COMPANIES |                      |     |    |       |            |
|-------------------|----------------------|-----|----|-------|------------|
| N                 | COMDISCO INC         | 25  | 12 | 16.50 | +0.5 +3.1  |
| N                 | CONTINENTAL INFO SYS | 138 | 5  | 8.63  | -0.3 -2.8  |
| O                 | FINALCO GROUP INC    | 5   | 3  | 3.38  | +0.1 +3.6  |
| O                 | PHOENIX AMERN INC    | 6   | 2  | 4.38  | +0.8 +22.8 |
| O                 | SELECTREM INC        | 12  | 5  | 6.50  | +0.5 +8.3  |
| N                 | U.S. LEASING         | 46  | 32 | 41.50 | -1.1 -2.6  |



# COMPUTER INDUSTRY

## INSIDE

A healthy market exists for "hot" computer parts such as the recently stolen circuit boards from DEC/141

DCA reports its third acquisition of the year/145

Storage Technology takes another step toward emergence from bankruptcy/147

Hitachi considers producing its mainframes in the U.S./164

## INSTANT ANALYSIS

"The computer software industry is a major beneficiary of tax reform. . . . The typical company in the industry should see reported earnings rise about 15%."

— Curt A. Monash  
Paine Webber, Inc.

## Burroughs-Sperry ax falls

Blumenthal says 9,600 jobs to be cut by end of year

By Clinton Wilder

DETROIT — The long-awaited job reduction ax from the Burroughs Corp.-Sperry Corp. merger fell last week as Burroughs announced plans to cut almost 10,000 jobs in the merged company by the end of the year.

The across-the-board cuts will slash the company's 120,000-member worldwide work force by approximately 8%, or 9,600 positions. "As a result of the merger, we are able to reduce redundant and duplicative functions and further streamline operations," said W. Michael Blumenthal, chairman and CEO of the merged company.

A Burroughs spokesman said Burroughs

employees will have no automatic advantage over their Sperry counterparts in holding jobs targeted for elimination. The company expects to save more than \$100 million in personnel costs as a result of the cuts, but the spokesman would not comment on the firm's one-time charge associated with the reduction.

Although Burroughs and Sperry are attempting to minimize the number of layoffs with an early retirement incentive program for employees age 55 and older, it appears that the majority of job reductions will be by layoffs.

The company spokesman said slightly more than 1,000 employees will be eligible for the retirement program, which also requires a minimum of 15 years' service with either Burroughs or Sperry.

"Sperry, like IBM, has a very healthy pension budget and can offer a lot of incentives," he said.

See BURROUGHS page 164

## Wang forms single marketing unit

By Alan Alper

LOWELL, Mass. — Wang Laboratories, Inc. is forming a single marketing organization, under the direction of company founder and chairman An Wang, in an attempt to cultivate new customers and retain existing ones.

The formation of a single marketing group comes only months after the company's top marketing executive, J. Carl Masi Jr., resigned after most of his responsibilities were spread throughout the company (CW, April 14). The move also reflects An Wang's increasingly visible role in the implementation of marketing strategies, analysts said.

The seven vice-presidents forming the new organization were pulled from groups reporting to Senior Vice-President Robert Doretto and chief development officer Horace Tsiang, as well as Wang himself.

The marketing group will include Robert Ano, vice-president of market analysis and planning; Richard Orlando, vice-president of the target markets program and education support; Eli Wachstein, vice-president of business development; Robert Borgmeyer, vice-president of solutions marketing; Samuel Gagliano, vice-president of financial markets; Robert Bozeman, vice-president of Wang Information Services Co.; and Richard Connaughton, vice-president of voice communications.

A Wang spokesman said the firm was creating the new organization to consolidate marketing into one group as well as to provide a sharper focus on the firm's target markets, new opportunities and sales support.

"This is also a way for us to prepare cohesive marketing plans for our field sales," he said.

See WANG page 144



INDUSTRY INSIGHT  
Clinton Wilder

## Microsoft goes for the gold

Where will it end for Microsoft Corp.?

The hottest company to go public in 1986 raised financial community eyebrows last week by preannouncing its first fiscal-quarter results. The official numbers will be released next week in the usual flood of computer industry quarterlies, but the pride of Redmond, Wash., grabbed itself some nice business press headlines by telling the world that it never heard of a summer software slump.

Sales for the quarter ended Sept. 30 will be up 87%, to \$66 million, and profits will soar 142% to more than \$15 million, Microsoft said. Although the firm's official release said only that sales were higher than anticipated "across all product groups both here and abroad," it is the company's international sales that bear watching.

Under the direction of young (who isn't at Microsoft?) Vice-President of International Operations Scott Oki, who was recently promoted to head U.S. sales and marketing, the company's overseas activities have burgeoned. Oki says the Microsoft approach is to emphasize local autonomy and hiring in its operations around the globe, and he claims that it is practically impossible to find a U.S. citizen working in a full-time capacity in most foreign markets.

See MICROSOFT page 143

Wilder is Computerworld's senior editor, computer industry.

## Ashton-Tate gears up for 'clone-resistant' IBM micros

### Reaction to IBM, Intel microchip agreement

By Ninamary Buba Maginnis

BALTIMORE — Ashton-Tate President Edward Esber told securities analysts and investors last week that his company has chartered a SWAT team to develop micro software applications that will prepare for any future proprietary "clone-resistant" microcomputers made by IBM.

Esber's explanation of the Ashton-Tate strategy followed last week's IBM announcement of a chip agreement with Intel Corp. that could make IBM microcomputers more proprietary.

Microsoft Corp. President Jon Shirley, however, remains unconcerned about the impact IBM's shift may have on his firm's industry-standard MS-DOS operating system.

Esber and Shirley were among several top software industry executives to present their firms' financial sta-

tus and growth plans at the annual computer services seminar sponsored by Baltimore-based Alex Brown & Sons.

Under the pact announced last week, IBM may design proprietary versions of Intel microprocessors, including the 80386. In return, IBM, which owns roughly 20% of Intel, will supply the Santa Clara, Calif., chip maker with a library of selected IBM chip designs.

Intel will also have access to computer-aided design and other advanced chip manufacturing techniques currently used by IBM. IBM is the world's largest producer of semiconductors, all of them for use within IBM products.

"We believe the DOS path will continue," Esber told seminar attendees. To succeed, micro application vendors must adhere to evolving industry standards, he said, but he cau-

tioned against exclusive adherence to those standards. "Even if you standardize, you can get trapped in standards and architecture," Esber warned.

Ashton-Tate's two research and development teams will help prepare the vendor for changes in the micro marketplace, according to Esber. One R&D team will follow the traditional MS-DOS operating system path, while a special team will explore the Intel 80386-based micro "revolution," Esber said.

The alternative development path consists of building two bridges, one for file compatibility and another for language compatibility, he said.

"The financial effect of IBM closing the operating system depends on how closed IBM makes its system," Esber said. "We don't believe they'll close application development at this time."



Ashton-Tate's Esber

Shirley said that IBM will probably maintain an MS-DOS operating system, adding that his firm's relationship with the computer giant is very strong.

"What IBM can get from Intel is not strange or unique," Shirley said in a separate interview. "It's something any customer can get. I don't view the agreement as something negative. I don't know anything IBM is doing to change the basic direction of the PC business by this arrangement. It sounds to me like Intel has more to benefit from it than IBM."

IBM could announce a proprietary 80286 microcomputer and then upgrade to an 80386 technology, Esber speculated. He recalled IBM's entrance to the personal computer arena in 1981 and noted how VisiCorp's Visicalc gave way to Lotus Development Corp.'s 1-2-3.

"It was a tumultuous time, and many have made the transition," he said. But he predicted IBM would stay with MS-DOS, preventing another industry upheaval.



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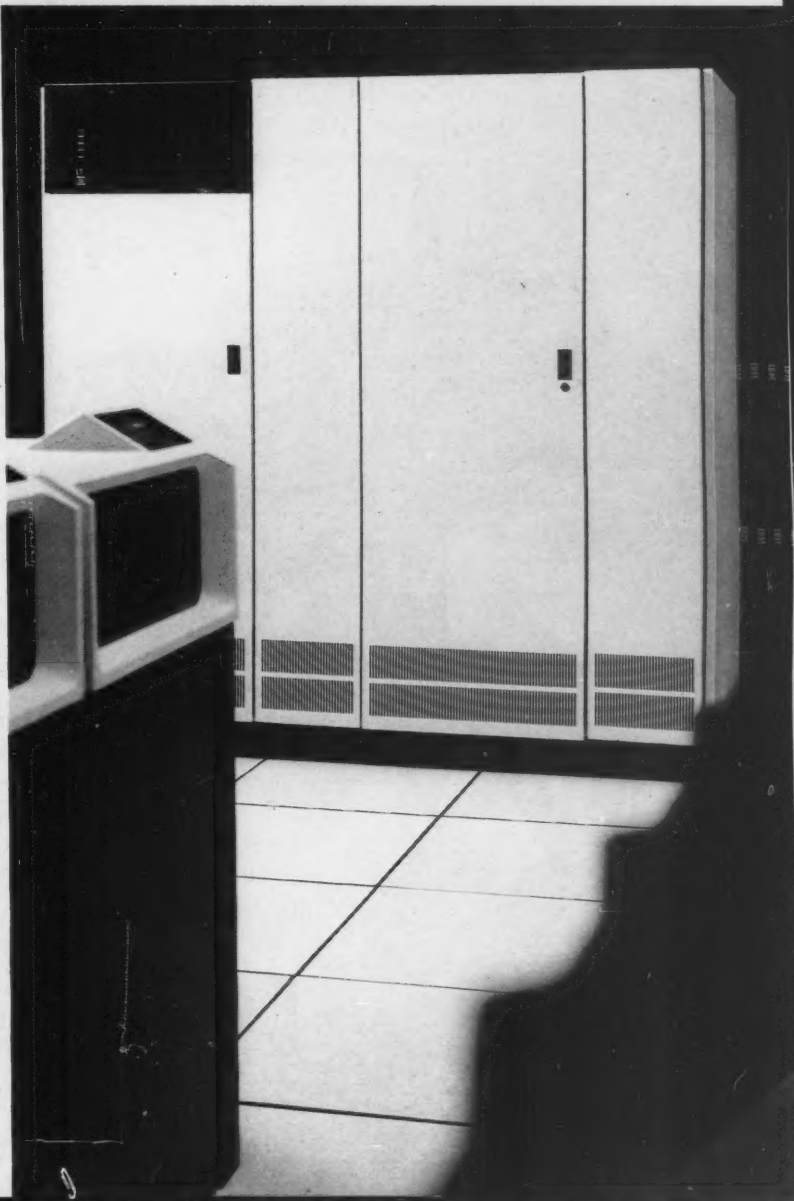
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